Advant® OPC Server for Advant Fieldbus 100

Version 1.1

User´s Guide

3BSE013896R101

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Chapter 1 Introduction

1.1 Before You Begin

This guide describes the Advant OPC Server for Advant Fieldbus 100 (Advant OPC Server for AF100), which is a standard OPC interface for Advant Fieldbus 100. OPC is a software technology standard used by Windows based applications to access data from process control systems. The basic principle of OPC is that OPC client applications communicate with an OPC server via a standardized, open and therefore vendor independent interface.

The Advant OPC Server for AF100 provides OPC client applications, such as Human Machine Interface (HMI) products or custom-build applications, access to process objects in Advant Controllers (AC160, AC110 and AC70) and Application Controllers (APC).

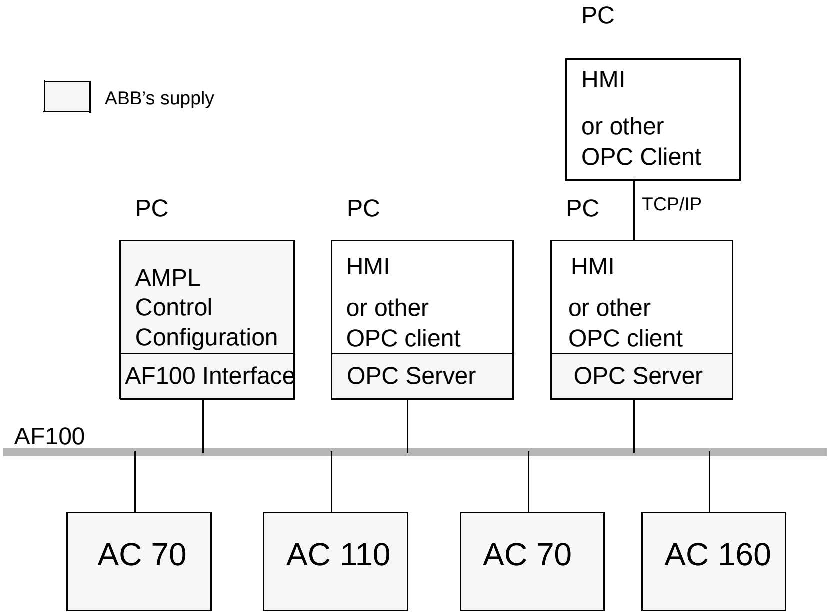


Figure 1-1. Example of an installation with Advant OPC Server for AF100.

The Advant Fieldbus 100 is a high-performance bus specially designed for real-time applications. It features reliable, cyclic data transfer using DataSet peripherals (DSP) as well as event-driven background transfer of service data.

If you are a user responsible for installation, configuration, runtime operation or maintenance of the Advant OPC Server for AF100, this manual is intended for you.

To configure and build applications, you are required to have knowledge of configuration and programming with the applications included in the AMPL Control Configuration (ACC) product. When running the AMPL Control Configuration it is possible to use both the AF100

Interface and the OPC Server. For runtime operation of the Advant Fieldbus 100, basic Windows NT skills are required.

1.2 Equipment Requirements

The following recommendations apply for the Advant OPC Server for AF100:

Personal computer (PC)	Pentium II 233 MHz
Primary memory	64 Mb
Operating system	Windows NT version 4.0 with service pack 3 or later.

The PC must be equipped with at least one full length ISA bus slot for installation of the CI526V1 board.

It is a requirement that the selected personal computer must be designed to withstand climatic, mechanical and electrical effects in the intended environment.

1.3 How to Use This Book

This book is organized into chapters and sections as shown in Figure 1-2.

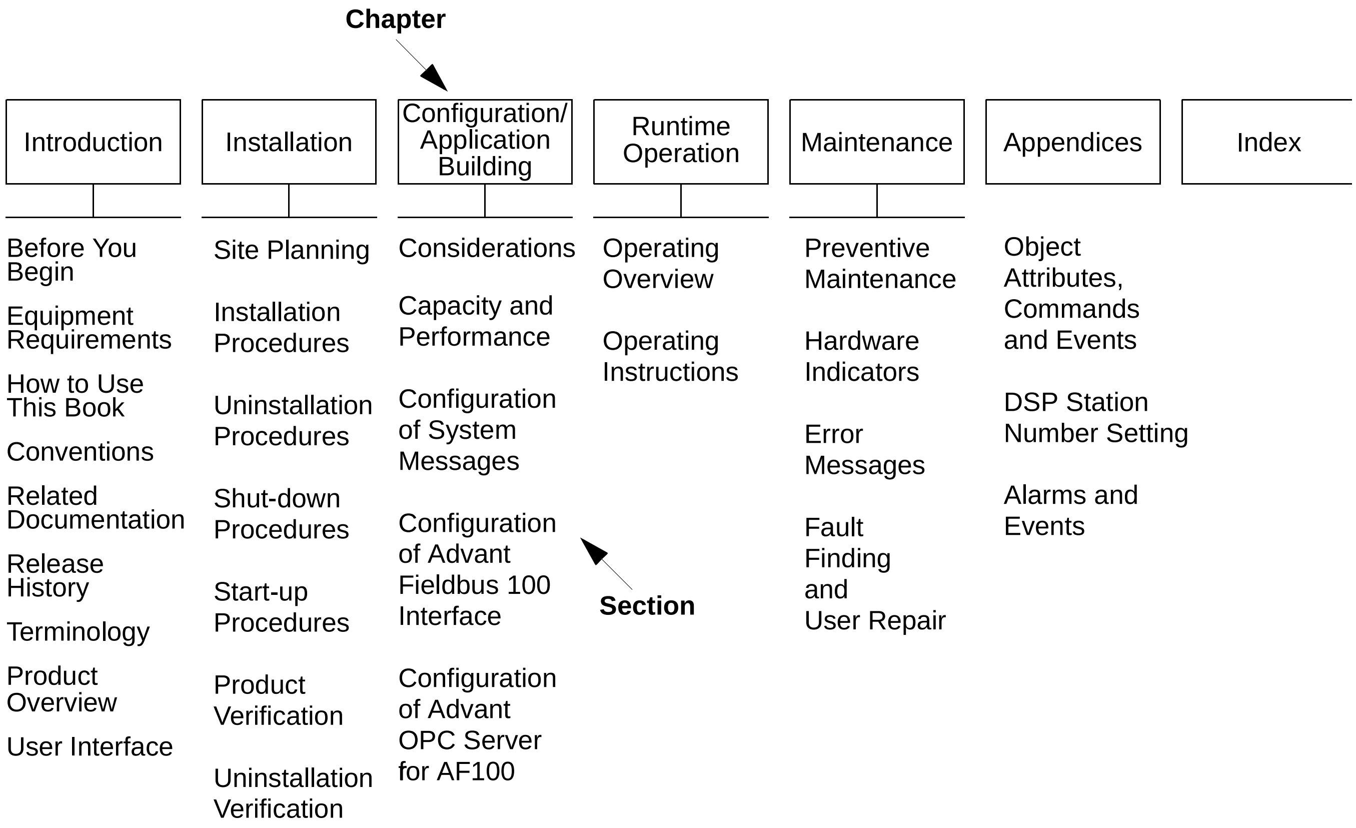


Figure 1-2. Organization of the Manual

1.4 Conventions

The following conventions are used throughout this manual for the presentation of material:

- The words in proper names of screen elements (for example, the title in the title bar of a window, the label for a field of a dialog box) are initially capitalized.
- The names of keyboard keys are boldfaced.
  - Initial capital letters are used for the name of a keyboard key if it is labeled on the keyboard. For example, the **Return** key or **<Return>**.
  - Lowercase letters are used for the name of a keyboard key that is not labeled on the keyboard. For example, the **space bar**, **comma key**, and so on.
  - In descriptions, the word “key” is used in conjunction with its name. For example, pressing the **Return** key initiates the process.

  - In tables and procedures, angle brackets replace the word “key.” For example, press **<Return>**.
  - A dash is used to indicate that you must simultaneously press several keys. For example, **<Ctrl-C>** indicates that you must hold down the **Control** key while pressing the **C** key.
  - The phrase “press and release” is used to indicate that you sequentially press several keys. For example, to close a window, press and release **<Alt>**, and then **<F4>**. This indicates that you press and release the **Alt** key, and then you press and release the **F4** function key.
- The names of push and toggle buttons are boldfaced.
  - Initial capital letters are used for the name of a push or toggle button labeled on the display. For example, the **OK** button.
  - In descriptions, tables and procedures, the word “button” is used in conjunction with its name. For example, pressing the **OK** button initiates the process.
- The names of menus and menu items are boldfaced.
  - Initial capital letters are used for the name of menus listed in the menu bar. For example, the **File** menu.
  - Initial capital letters are used for the name of menu items. For example, to open a new window, choose **New** from the **File** menu.
  - Shorthand for commands that you choose as items from menus, for example, command **Exit** from the **File** menu, appears as **File | Exit**.
- System prompts/messages are shown in the Courier font, and user responses/input are in the boldfaced Courier font. For example, if you enter a value out of range, the following message is displayed:

  ```
  Entered value is not valid. The value must be 0-30.
  ```

  In a tutorial, you may be told to enter the string TIC132 in a field. The string is shown as follows in the procedure:

  `TIC132`

1.5 Related Documentation

Table 1-1 lists the documentation related to the Advant OPC Server for AF100.

Table 1-1. Related Documentation

Category	Title	Description
Hardware	Advant Fieldbus 100 User's Guide	Describes how to use the AF100 Network. It also provides a technical description of communication boards and modems available
Software	Application Builder User's Guide	Describes installation of Advant Engineering components and contains the operation instruction of Application Builder and Advant Engineering support functions
	Bus Configuration Builder User's Guide	Describes bus configuration support functions for AF100 OPC based and AdvaSoft for Windows based Human Machine Interface systems.
	Function Chart Builder User's Guide	This guide describes how Function Chart Builder can be used to configure different target systems.
	AMPL Configuration Advant Controller 100 Series Ref. Manual	Contains instructions about configuration and application programming, fault tracing and maintenance of AC160/AC110/AC70/AC55.
	Data Base Elements Advant Controller 100 Series Reference Manual	Contains instructions and the data sheets for all data base elements available for Advant Controller 100.
Other	www.opcfoundation.org	Web page for the OPC Foundation, where you can find information about the OPC specifications and links to other sources of information about OPC.

1.6 Release History

Table 1-2 lists the major milestones in the development of the Advant OPC Server for Advant Fieldbus 100.

Table 1-2. Release History

Version	Description
1.0/0	First version of Advant OPC Server for Advant Fieldbus 100
1.1/0	Version including the Alarms and Events Interface.

1.7 Terminology

1.7.1 Abbreviations

The following is a list of abbreviations used in this guide.

Term	**Description**
AC	Advant Controller, the common term for the series of controllers used in ABB automation systems, for example AC160, AC110.
ACC	AMPL Control Configuration. The Windows NT part of the configuration software for Advant OCS.
AF100	Advant Fieldbus 100. AF100 is a high speed communication link intended for communication between controllers in the AC 400 and AC 100 series and other equipment adapted for the bus. The transmission rate is 1.5 Mbit/s and it supports three transmission media: twisted pair, coaxial and optical media.
AMPL	ABB Master Programming Language. A function-block language with graphic representation which is especially developed for process control applications.
APB	Application Builder. The software module in AMPL Control Configuration used to handle projects, nodes, circuits and type circuits.
APC	Application Controller, a control unit used for motor drives, etc.
AS	Advant Station, the common term for the Advant Station series of operator, engineering and information management stations within ABB automation systems.
BCB	Bus Configuration Builder. The software module in AMPL Control Configuration used to create and maintain the Bus Configuration Database.
BCD	Bus Configuration Database contains configuration data of nodes and busses on the AF100 network belonging to a project.
BCI	Bus Configuration Interface. Internal interface to the Bus Configuration Database for the Advant OPC Server for AF100. Implemented according to Microsofts's Component Object Model (COM).
COM	Component Object Model, a specification that defines how individual software components can interact and share data under Windows. Developed by Microsoft.
DCOM	Distributed COM. Extends COM to networks.

Term	Description
DSP	DataSet Peripheral, a block of data to be transmitted on Advant Fieldbus 100. In the controller the DataSet Peripheral is represented with a database element.
EISA	Enhanced ISA. See ISA.
ESD	Electrostatic Discharge.
EVS	Event Sets, the object type for transmitting time tagged events on the Advant Fieldbus 100 network.
FCB	Function Chart Builder, the graphic configuration and programming tool in AMPL Control Configuration.
HMI	Human Machine Interface.
ISA bus	Industrial Standard Architecture. An ISA bus is a standard IBM PC AT compatible internal 16-bit bus.
LED	Light Emitting Diode. LEDs are often used as indicators on control panels.
OLE	Object Linking and Embedding. A technology, based on COM, developed by Microsoft.
OPC	OLE for Process Control.
OS	Operator Station, a station with operator interactive functionality.
PC	An abbreviation for both personal computer and process control.
SDP	Service Data Protocol used to send messages on the Advant Fieldbus 100 network.
XDB	Extended DB Elements

1.7.2 Definition of Terms

The following is a list of terms associated with the Advant OPC Server for AF100 that you should be familiar with.

Term	Description
Advant OCS	The term refers to one or more of the open control systems from ABB, i.e., ABB Advant, ABB Master and ABB MOD 300.
Bus Master	A bus master is a device which administrates the information flow on the Advant Fieldbus 100
CI Board	A CI board is a Communication Interface Board, used to connect a PC to the Advant Fieldbus 100 bus.

Term	Description
Client Application	A client application is an application which subscribes for data and/or sends commands to objects in the automation system.
Clock Master	A clock master is a device which distributes time on the bus to synchronize clocks in nodes on the Advant Fieldbus 100.
DAT Based Objects	Object types with, compared with the Extended DB Elements, limited object support.
Extended DB Elements	These object types offer complete support for the different object attributes.
Function chart	A function chart is a diagram for the representation of process control programs. It contains graphical symbols (rectangles) for PC elements and lines for connections between element terminals.
Object (Process)	Object (Process) is a physical or calculated process object, or a functional unit or type circuit containing all related inputs and outputs. An example of a process object is an analog input including value, limits, status, etc. There are two kinds of objects, Extended DB Elements and DAT based objects
PC element	PC element is an abbreviation for process control element, which is part of a process control program. PC elements are represented by rectangles in a function chart and by corresponding callnames in a tree diagram
PC program	PC program is an abbreviation for process control program.

1.8 Product Overview

The Advant OPC Server for AF100 software enables data exchange between Windows applications and stations on the Advant Fieldbus 100 network.

The provided OPC Server can be used by any client application with support for the mandatory Custom Interface, the Automation Interface as well as the Alarms and Events Interface according to the OPC Foundation standard.

The Advant OPC Server for AF100 1.1 is based on the OPC Data Access Specification version 1.0A and the OPC Alarms and Events specification version 1.0.

OPC Custom Interface

The OPC Custom Interface is used for high-performance applications written in a compiled language such as C++.

OPC Automation Interface (valid for Data Access)

The OPC Automation Interface for higher level applications developed in for example Visual Basic for Applications.

Alarms and Events Interface

The Alarms and Events Interface is used for broadcasting alarm and event information from servers to clients.

Optional IOPC BrowseServerAddressSpace

The IOPCBrowseServerAdressSpace provides a way for clients to browse the available data items in the server.

You can find information about the specifications and the work of the OPC Foundation at the OPC Foundation home page: *www.opcfoundation.org*.

The following components are needed for the Advant OPC Server for AF100:

- The Advant OPC Server for AF100 software including the AF100 Interface software
- CI board
- Modem(s).

Below is a conceptual overview of the Advant OPC Server for AF100 and related software.

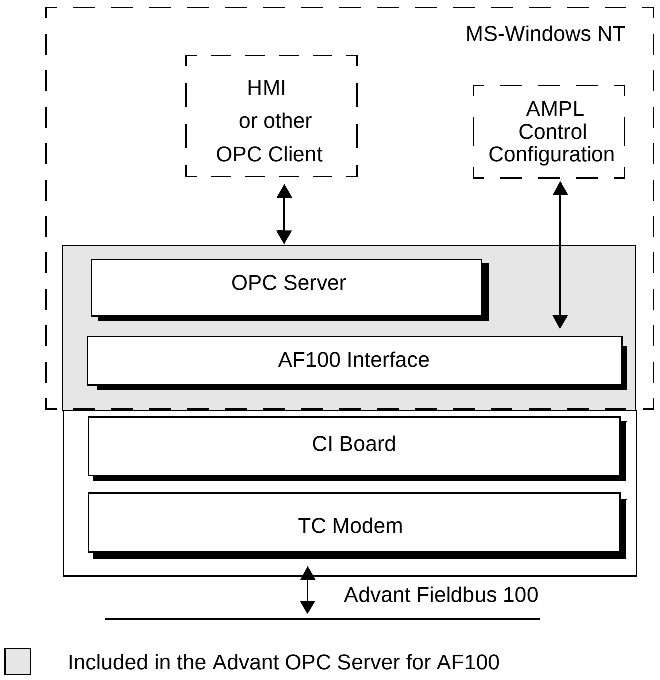


Figure 1-3. Advant OPC Server for AF100 software conceptual overview

1.8.1 Communication Overview

There are two mechanisms for communication on the Advant Fieldbus 100:

- DataSet Peripheral (DSP)

DSPs are broadcasted cyclically to all stations on the Advant Fieldbus 100 network. The DSP communication is configured and handled by the CI526V1 board. The AF100 OPC software has functions to read and write data to these DSPs. The DSPs are used to transfer values for process objects on the Advant Fieldbus 100 network.

- Service Data Protocol (SDP)

  The SDP is used to transfer messages between applications in different stations on the Advant Fieldbus 100 network. SDP is used for service requests (command) to process objects and for receiving time tagged events (Event Sets). SDP is also used by AMPL Control Configuration when connecting to the Advant Controller 100 Series using the AF100 Interface.

1.8.2 Functional Overview

The Advant OPC Server for AF100 provides the following functionality:

- **Object Handling**

  The Advant OPC Server for AF100 supports two groups of objects, Extended DB Elements and DAT based objects. The DAT based objects have limited functionality compared with Extended DB Elements, which provides an almost complete object support as for corresponding object types in the Advant Controller 400 series. For these groups of objects the Advant OPC Server for AF100 provides the following object handling functions:

  – **Data Subscription**

    Values for process objects are received from the AF100 network using cyclic DataSet Peripheral (DSP). Alarm Limits, for the Extended DB Elements only, are received from the AF100 network using Service Data Protocol.

Subscription of other object attributes such as object description, engineering unit, etc., is also provided. These attributes are not transferred via the AF100 network, but retrieved from the Bus Configuration Database in AMPL Control Configuration.

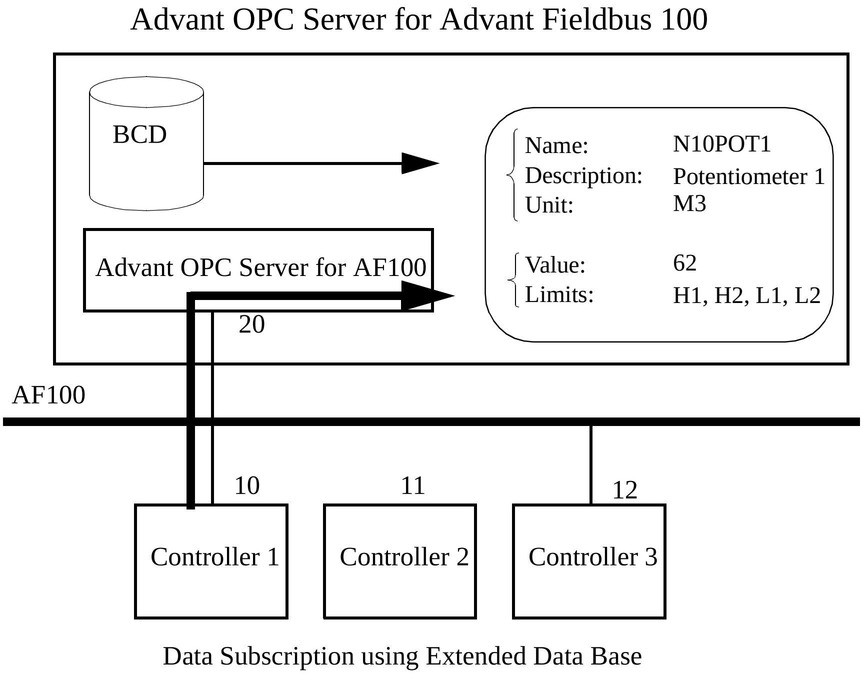

Advant OPC Server for Advant Fieldbus 100
BCD
Name: N10POT1
Description: Potentiometer 1
Unit: M3
Value: 62
Limits: H1, H2, L1, L2
Advant OPC Server for AF100
20
AF100
10
11
12
Controller 1
Controller 2
Controller 3
Data Subscription using Extended Data Base

Figure 1-4. Example of data subscription for an AI-signal

– **Service requests**

Service requests (commands) can be sent from the application to change object attributes on the Advant Fieldbus 100 network. For DAT based objects the attribute Value can be changed in the controller and the Acknowledge operation is processed by the OPC Server itself. For Extended DB Elements, the attributes Value, Block, Deblock and Acknowledge are examples of attributes that in the controller that can be rechanged. See also Appendix A, Object Attributes, Commands and Events.

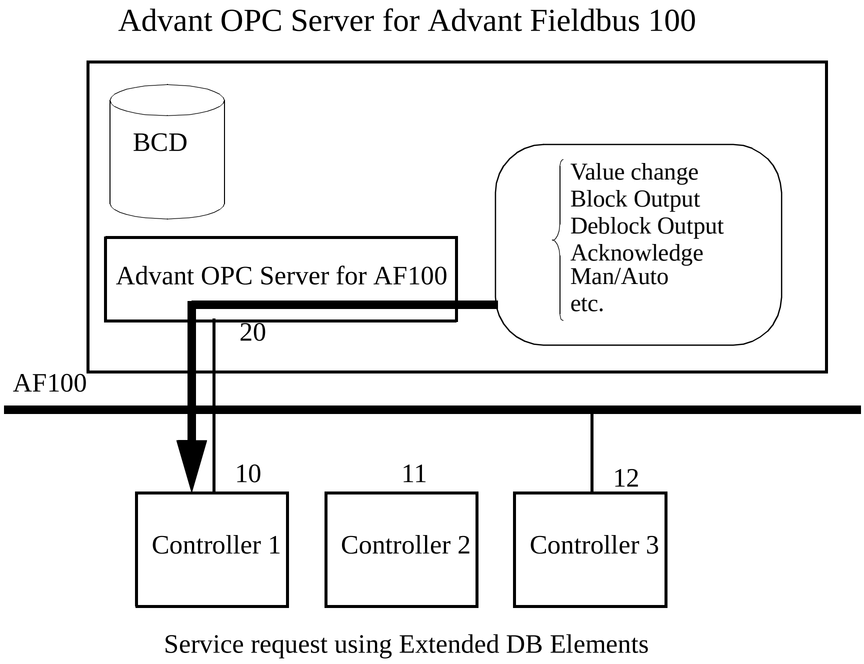


Figure 1-5. Example of data subscription for an AI-signal with Event Handling

– **Event Handling**

The Advant OPC Server for AF100 can be configured to receive time tagged events, via Event Set (EVS), from the AF100 network.

The time tagged events contain object information such as the reason for the event and a time stamp. This information, together with user-defined object information such as object description, engineering unit, etc., can be used by the client application to generate events and alarms.

For DAT based objects, alarm acknowledgment by the client application can be distributed on the AF100 network to other PCs equipped with the Advant OPC Server for AF100 or AdvaSoft for Windows. This is done automatically for Extended DB Elements.

Table 1-3 below shows which services are available for applications supported for each object type using the Advant OPC Server for AF100.

Table 1-3. Services provided to application using Advant OPC Server for AF100

Object type	Demand	Cyclic	Event	Command
DAT_AI(1)/AIS(2)	yes	yes	yes	yes
DAT_AO(1)/AOS(2)	yes	yes	yes	yes
DAT_DI(1)/DIS(2)	yes	yes	yes	yes
DAT_DO(1)/DOS(2)	yes	yes	yes	yes
DAT_DAT(1)	yes	yes	no	yes
MB(3)	yes	yes	yes	yes
MBS(3)	yes	yes	yes	yes
MR, MI and MIL(3)	yes	yes	no	yes

(1) These are DAT Based Elements object types. They are mapped on DAT’s and transferred with DataSet Peripherals (DSP) for subscription and Service Data Protocol (SDP) for commands.

(2) These objects are the Extended DB version of the AI, AO, DI and DO objects. See Appendix A, Object Attributes, Commands and Events

(3) These objects belong to the Extended DB Elements object group but are mapped towards DAT objects

- **Alarms and Events Interface**

  Alarms and events are distributed on the AF100 bus and are accessible according to the first OPC Foundation standard for Alarms and Events Interface.

- **System Status**

  This function shows status information and nodes reachable via the Advant OPC Server for AF100. See Chapter 4.2.1, How to View System Status.

- **Time Synchronization**

  The Advant OPC Server for AF100 can act as clock master, slave or backup node on the AF100 bus.

- **Hardware Configuration and Diagnostics**

  It is possible to view and change the configuration parameters for the CI526V1 communication board.

  The Mutual Lifesign Supervision function in Advant OPC Server for AF100 supervises the CI526V1 board and automatically tries to restart it in case of board failure. If the Advant OPC Server for AF100 has an uncontrolled stop the CI526V1 board goes to passive state and the DSP transmission stops.

- **Support for AMPL Control Configuration**

  All object configuration are made in the AMPL Control Configuration. The configuration data are stored in the Bus Configuration Database where it is accessible by the Advant OPC Server for AF100 via the Bus Configuration Interface.

  The AF100 Interface, used together with the Function Chart Builder (FCB), provides remote engineering of nodes on the AF100 bus.

- **System Messages**

  System messages are presented in the System Message Viewer.

1.9 User Interface

The Advant OPC Server for AF100 graphical user interface (GUI) conforms to normal NT look and feel. That is, to activate some of the functions included, start by **Start** button, then click on **Advant**, and so on.

The example in Figure 1-6 below shows how to start the AF100 Interface Diagnostics.

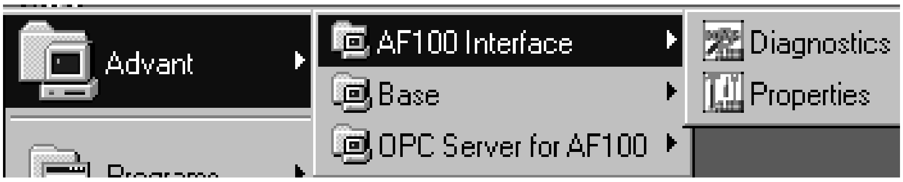


Figure 1-6. Advant Fieldbus 100 Interface start menu

See Figure 3-9 and Figure 3-44 for more information about the AF100 Interface Diagnostics.

Chapter 2 Installation

2.1 Site Planning

When you are site planning, it is important that you check that requirements for environmental conditions (temperature, humidity, chemical), grounding and power supply are met, according to standards for your application. These requirements are stated in the hardware documentation for your PC and in the *Advant Fieldbus 100 User's Manual.*

NOTE

It is important that the PC and the external TC modem(s) are connected to the same grounding point.

Connect the mounting plate as shown in Figure 2-1.

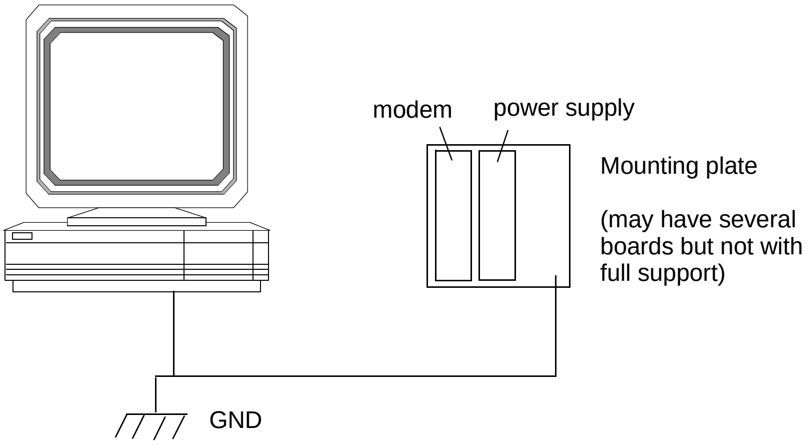


Figure 2-1. PC and TC modem grounding requirements

2.2 Installation Procedures

This chapter covers the installation and setup of the Advant OPC Server for AF100. Here you will find instructions for:

- Strapping and installation of the CI board
- Installation of the modem and the power unit
- Installation steps for the Advant OPC Server for AF100 software.

For a description of how to connect the modem to the AF 100 network, see the *Advant Fieldbus 100 User's Guide*.

NOTE

Only one CI526V1 board is supported in the PC.

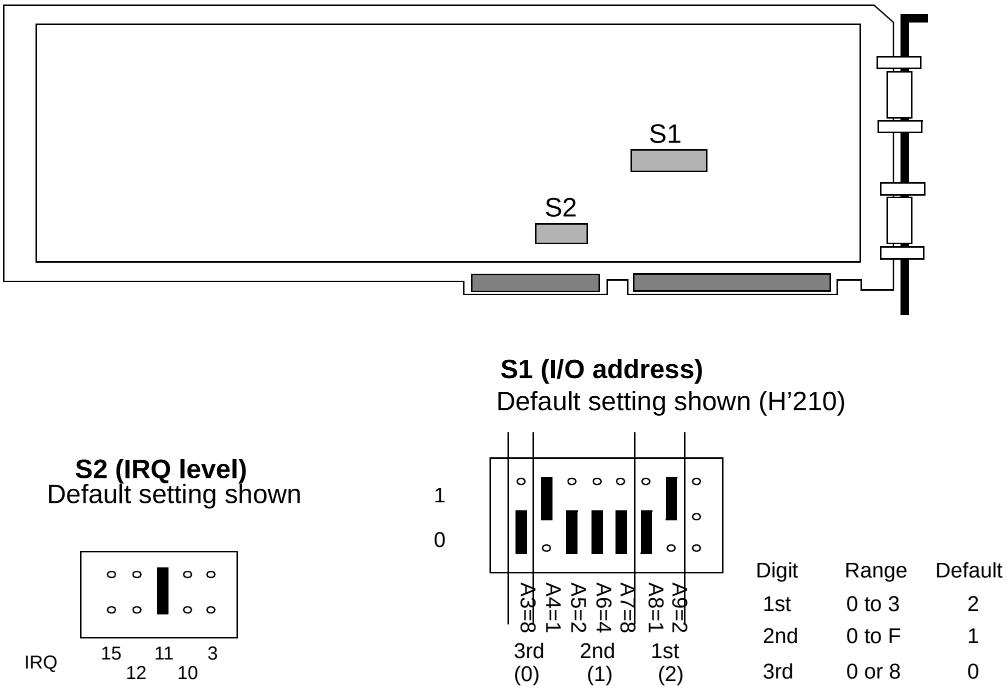
2.2.1 CI Board Strapping and Installation

The CI board has default settings for the I/O address (H’210) and interrupt level (IRQ 11). Before mounting the CI board, check that these default settings are not being used by any other device in your PC.
Use the **Administrative Tools | Windows NT Diagnostics** to check the settings for devices in your PC.

If you need to change the default settings, follow the instructions below.

CAUTION

To avoid electrostatic discharge (ESD) damage to the CI board, we recommend that you exercise preventive maintenance precautions such as using a grounded wrist band and anti-static pad when handling the CI board and other electronic boards. Avoid skin contact with components.



Digit	Range	Default
1st	0 to 3	2
2nd	0 to F	1
3rd	0 or 8	0

Figure 2-2. CI board strapping

IRQ level selection

Set IRQ by placing the strap on the required IRQ according to the diagram in Figure 2-2.

I/O address selection

The S1 connection block includes strappings for setting binary bits A3 to A9 to 0 or 1. The default settings are 2, 1 and 0, respectively (all digits are in Hex), and are shown in Figure 2-2.

- A3 comprises the most significant bit (8) in the least significant digit of the I/O address. Bits 0, 1 and 2 are preset to 0 and cannot be modified.
- A4 to A7 comprise digit 2, where A4 is the least significant bit and A7 is the most significant bit.
- A8 and A9 comprise the first digit, where A8 = 1 and A9 = 2.

CI board installation

When you have finished strapping the CI board, follow the mounting instructions below and the instructions in your PC manual regarding how to add cards on the ISA/EISA bus.

WARNING

Cut main power supply and read the instructions supplied with your PC's documentation before you start to disassemble.

Install the CI board as follows:

1. Disconnect the PC's main power supply.
2. Open up the PC's chassis and locate an empty ISA bus slot.
3. Remove a spare board slot cover.
4. Plug the CI board firmly into place and secure with fixing screw.
5. Close the PC's chassis and reconnect the main power supply.

2.2.2 TC Modem Installation

Connect the connection cable to the CI board, the modem(s) and the power supply unit, as shown in Figure 2-3.

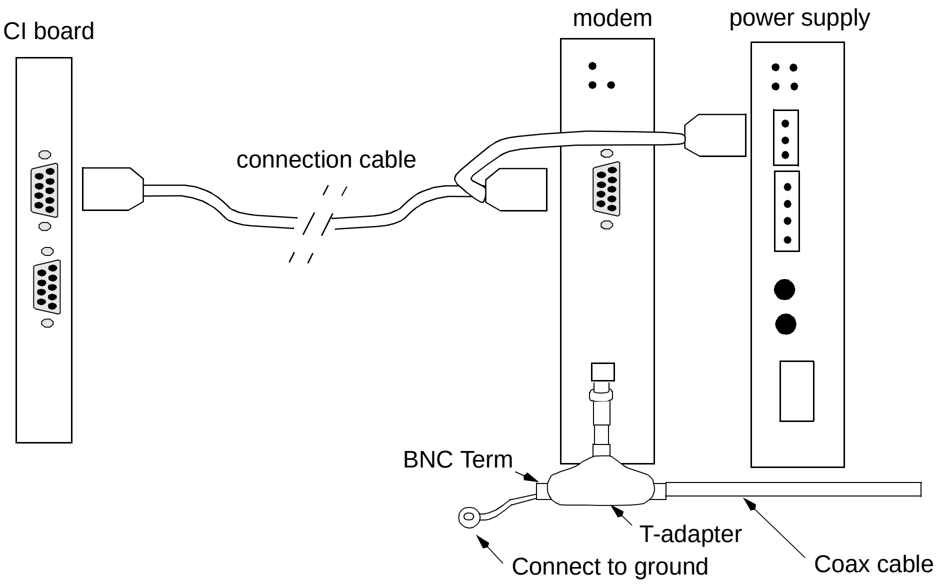


Figure 2-3. Modem installation

The modem is connected to the Advant Fieldbus 100 network with a BNC T-adapter. Refer to the *Advant Fieldbus 100 User's Guide* for more information.

NOTE

It is important that both ends of the Advant Fieldbus 100 network cable be equipped with 75 ohm terminations. **One** of the terminations must also be connected to ground.

2.2.3 Software Installation

Before you start the installation make sure that you log in as a user with administration privileges.

Run the Advant OPC Server for AF100. Setup program from the CD.

1. **Welcome** -
   Click **Next**.
2. **Software License Agreement** -
   Please read the license agreement.

If you accept all the terms of the preceding license agreement- Click **Yes**.
If you click No, the Setup will close.

3. **User Registration -**
   Please register your product now. - Click **Next**.
4. **Registration Confirmation -**
   Confirm that the registration information is correct - Click **Yes**.
   If you click No, the Setup will close.
5. **Choose Advant Base Directory Destination Location**
   Choose default directory.
   Click **Next**.
6. **Advant OPC Server for AF100-**
   Select the options you want to install. The AF100 Interface is required to run the OPC Server.
   Click **Next**.
7. **Select CI526V1 Board I/O Port address -**
   If the selected I/O port address does not match the CI526V1 board setting, the driver will not operate properly. See Section 2.2.1, CI Board Strapping and Installation
   Click **Next**.
8. **Select CI526V1 Board Interrupt IRQ -**
   If the selected interrupt does not match the CI526V1 board setting, the driver will not operate properly. See Section 2.2.1, CI Board Strapping and Installation.
   Click **Next**.
9. **Enter Advant Fieldbus 100 bus number -**
   0 - 255.
   Use the same bus number as you use in the AMPL Control Configuration application.
10. **Enter AF100 Station Configuration -**
    Station number: unique id
    Redundant Line Support: if redundant modems are used
    Time Synchronization: (None, Master, Slave, Backup)
    Click **Next**.
11. **Enter the Bus Configuration Database (BCD) Path -**
    Please enter the path to the Bus Configuration Database.
    Click **Next**.
    If you are using a distributed BCD you must specify the UNC path to the shared drive e.g. \\Station1\AdvaBld, see also Chapter 3.5.1.2, Using a distributed Bus Configuration Database
12. **ABB Advant Setup Log -**
    Gives information about the configuration settings.
    Click **Next**.
13. **Restart Windows -**
    Choose **Yes** or **No**. To allow for a proper operation of the Advant OPC Server for AF100, it is preferable to restart Windows.
    Click **OK**.

NOTE

To be able to distribute acknowledgements of DAT based objects from one Advant OPC Server for AF100 to other OPC Servers or AdvaSoft for Windows stations, their station numbers (1-80) must be entered in the registry.
Use the example below to make a text file “**MyRemoteAckStations.reg**” .
Edit the text string in the file and save the file.
Double click the .reg file.
Run the.reg file.
Restart the Advant OPC Server for AF100.

The example below allows distribution of acknowledgements between station 1, 50 and 79.

```
[HKEY_LOCAL_MACHINE\SOFTWARE\ABB\Advant\SystemModules\AF100
OPC Server\Private]"AdvaSoftStations"=1,50,79 "
```

Figure 2-4. Example “MyRemoteAckStation.reg”

2.3 Uninstallation Procedures

Uninstallation removes the installed product from your machine,
i.e it removes:

- Files
- Registry entries
- Environment variables
- Start-menu icons
- Unregister ActiveX components

To run uninstallation you do as follows:

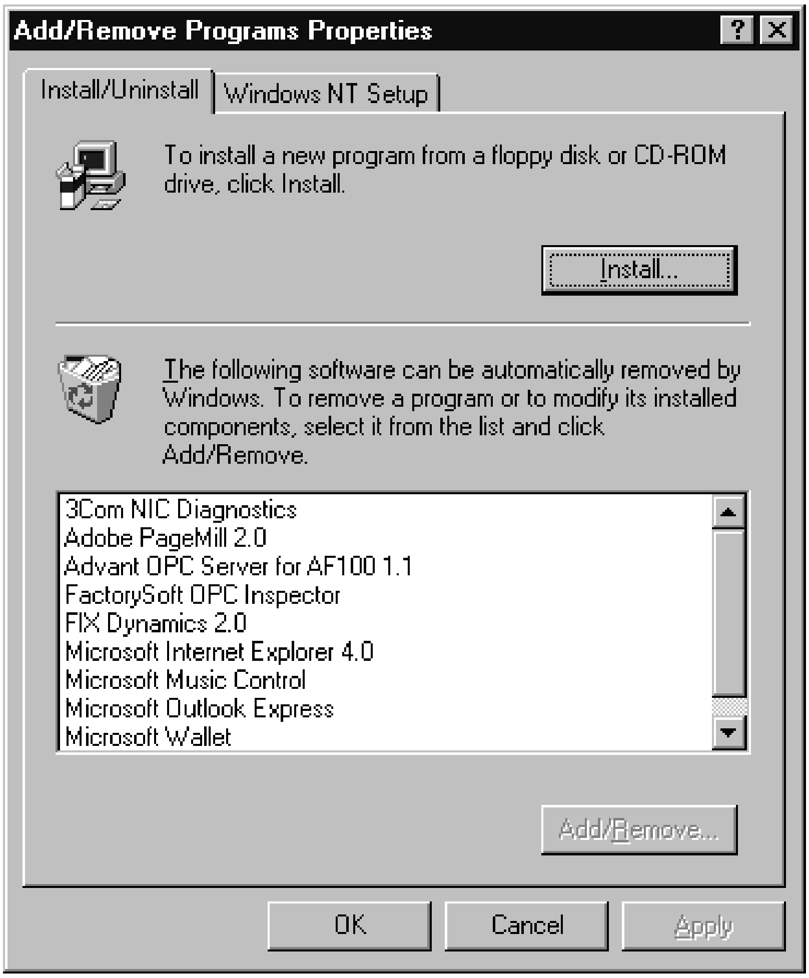
1. Stop the Advant OPC Server for AF100.

NOTE

The stop request sometimes seems to timeout. Use the NT task to verify that the process wiaopc.exe is no longer running.

2. Open the Control Panel

3. Double-click the icon **Add/Remove Programs** to view the Add/Remove Programs Properties window.



To install a new program from a floppy disk or CD-ROM drive, click Install.

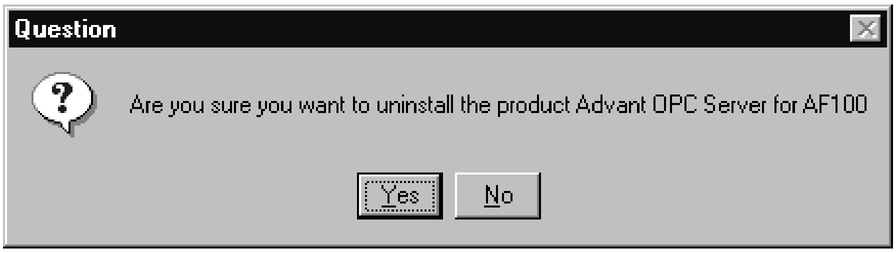
The following software can be automatically removed by Windows. To remove a program or to modify its installed components, select it from the list and click Add/Remove.

3Com NIC Diagnostics
Adobe PageMill 2.0
Advant OPC Server for AF100 1.1
FactorySoft OPC Inspector
FIX Dynamics 2.0
Microsoft Internet Explorer 4.0
Microsoft Music Control
Microsoft Outlook Express
Microsoft Wallet

Figure 2-5. Add/Remove Programs Properties

4. Select the product you want to uninstall and press the button **Add/Remove...**.

5. A window asking if you are sure to uninstall the specified product will appear. Click **Yes** if you are sure, otherwise click **No**.



Are you sure you want to uninstall the product Advant OPC Server for AF100

Figure 2-6. Uninstall question

6. Wait for the uninstallation to finish.

2.4 Shut-down Procedures

The Advant OPC Server for AF100 is implemented as a Windows NT service and is automatically stopped when Windows is shut down. If you have to change the shut-down configuration, then modify the settings in the Services Control Manager in the Windows NT Control Panel.

2.5 Start-up Procedures

The Advant OPC Server for AF100 is implemented as a Windows NT service and is automatically started when Windows is started. If you have to change the start-up configuration, then modify the settings in the Services Control Manager in the Windows NT Control Panel.

2.6 Product Verification

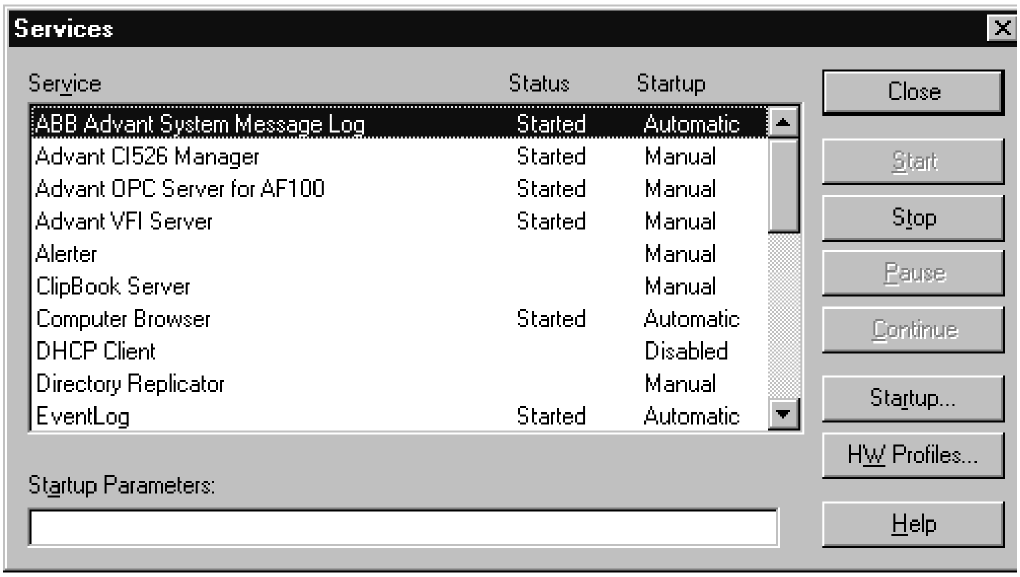
After you have performed the installation of the Advant OPC Server for AF100, you are recommended to verify that the software has been properly installed and that the system has contact with the Advant Fieldbus 100 network. To accomplish this, do the following:

1. Check that the Advant OPC Server for AF100, AF100 Interface and Advant Base functions are available from the Start menu. Select **Advant** from the Start menu.
2. Verify that the board is operational and all stations are reachable by viewing the Diagnostics. Select **Advant | AF100 Interface | Diagnostics** from the Start menu.
3. Check the System Messages application to ensure that no fatal errors are reported from the AF100 Interface software. Select **Advant | Base | System Messages** from the Start menu.
4. Verify that the Advant OPC Server for AF100 Properties are shown correctly by selecting **Advant | AF100 OPC | Properties** from the Start menu.

5. Verify that the Advant OPC Server for AF100 Service is listed and running by selecting **Settings | Control Panel | Services.** See Figure 2-7.

   If recommended verifications show problems, check the hardware by doing the following:

6. Check that the green P (power) LED on the modem(s) is lighted.
7. Check that the yellow RX (receive) LED on the modem(s) is lit (if other stations on the Advant Fieldbus 100 network are up and running).
8. When the Advant Fieldbus 100 Interface is started, check that the yellow TX (transmit) LED on the modem starts to blink.



Service	Status	Startup
ABB Advant System Message Log	Started	Automatic
Advant CI526 Manager	Started	Manual
Advant OPC Server for AF100	Started	Manual
Advant VFI Server	Started	Manual
Alerter		Manual
ClipBook Server		Manual
Computer Browser	Started	Automatic
DHCP Client		Disabled
Directory Replicator		Manual
EventLog	Started	Automatic

Startup Parameters:

Figure 2-7. Services

2.7 Uninstallation Verification

After you have performed the uninstallation of the Advant OPC Server for AF100, you are recommended to verify that the software has been properly uninstalled. To accomplish this, do the following:

1. Verify that the Advant OPC Server for AF100 Service is no longer listed in the Services window by selecting **Settings | Control Panel | Services.** See Figure 2-7.

Chapter 3 Configuration/Application Building

3.1 Considerations

Consider the following design aspects when creating configuration data and building applications:

- **Network configuration**

  Consider the limitation described in Chapter 3.2, Capacity and Performance.

- **DAT - Extended DB element**

  If you use Extended DB elements you have higher functionality (see Appendix A, Object Attributes, Commands and Events) and the application building in the controller is simplified. The amount of data transferred on the bus is increased if you use Extended DB elements compared with DAT based elements. Extended DB elements transfer object value and Status cyclically on the bus. DAT based elements only transfer value. Note that all controllers do not support Extended DB. See also Chapter 3.2.1, Compatibility

3.1.1 Sending Commands and Subscribing for Values

In the Advant OPC Server for AF100 you have two possibilities to communicate on the Advant Fieldbus 100:

- DataSet Peripheral (DSP)
- Service Data Protocol (SDP)

An overview of the DSP and SDP communication is described in Chapter 1.8.1, Communication Overview.

You can use both SDP and DSP to send commands and subscribe for values from the controller. You find recommendations on when to use the different methods in Chapter 3.1.1.1 - 3.1.1.4 below.

The differences between these two methods are summarized in the Table 3-1.

Table 3-1. Command methods

Command method	Advantages (+)	Disadvantages (-)
Service Data Protocol (SDP)	Multiple Advant OPC Servers for AF100 can send commands to the same object without any additional logic in the controller.	No guarantee when the command is sent. Depends on the load in the PC. Very low transmission speed, approximately 1..2 values per second can be transmitted with the SDP.
DataSet Peripheral (DSP)	High transmission speed, commands are sent directly, independent of the load in the PC. A command can be “broadcasted” to multiple controllers (all configured with a receiving DSP for this command).	Needs additional logic in the controllers to handle multiple Advant OPC Servers for AF100 sending value changes to the same object. Requires additional DSPs (one for sending the value and one for receiving the mirrored value from the controller).

- **Cyclic subscriptions and bus load**

  Subscription frequency is set in the client application. Subscription frequency that is higher than the frequency at which the DSPs are updated on the CI board, has no effect. Avoid this to minimize the AF100 Communication handler’s load. See Chapter 3.2, Capacity and Performance for calculation of bus load.

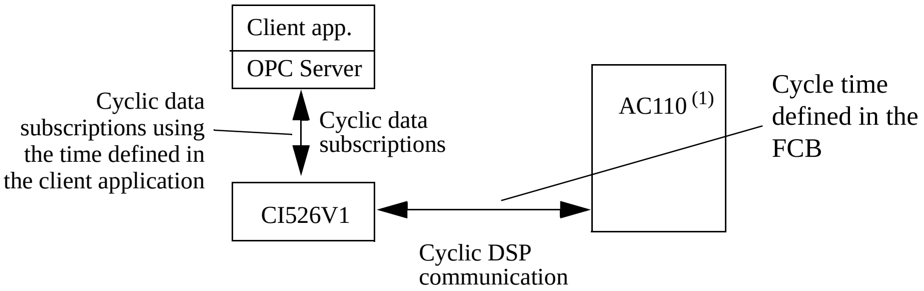

Client app.
OPC Server
Cyclic data subscriptions using the time defined in the client application
Cyclic data subscriptions
CI526V1
AC110 (1)
Cycle time defined in the FCB
Cyclic DSP communication

Figure 3-1. Time cycle sources to consider when subscribing for object values

(1) The cycle time of the PCPGM, Control module and SCANT should be considered internally in the controller.

3.1.1.1 DSPs Sent by the Controller

The controller sends the DSP containing the object value. The Advant OPC Server for AF100 and other nodes on the bus receive the DSP and can subscribe for the object data. All Advant OPC Server for AF100 nodes on the same bus can send commands to update the corresponding object value. The commands are sent via the SDP. You do not need to create any additional logic in the controller or in the Advant OPC Server for AF100 node.The SDP can directly be used to send commands to all objects defined in **receiving** DSPs in the Advant OPC Server for AF100. Sending DSPs from controller nodes can be used for both Extended DB elements and DAT based elements.

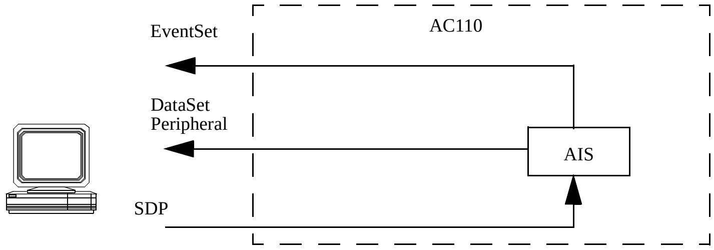


Figure 3-2. Commands sent via the Service Data Protocol for Extended DB elements

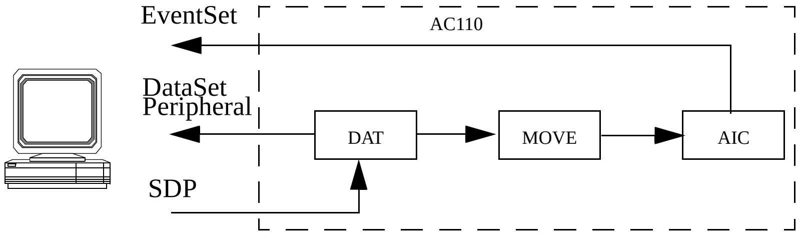


Figure 3-3. Commands sent via the Service Data Protocol for DAT based object

NOTE

Only **one** DAT_DI/DO object can be mapped to a DAT object with this solution since the command sent via the Service Data Protocol affects all bits of the DAT.

When to Use

- This is the most common way to work with all object types and it will give you minimum of engineering work.
- When several Advant OPC Server for AF100 nodes should be able to change an object value.
- This is the only supported communication feature when you are working with Extended DB Elements AIS, AOS, DIS, DOS since these objects have a DSP transferred object status and this status can only be written by the controller.
- This is preferred if the objects should generate events since the controller that sends the

value also sends the event.

When Not to Use

- When commands must be sent cyclically[1].

3.1.1.2 DSPs Sent by the Advant OPC Server for AF100

The Advant OPC Server for AF100 sends the DSP containing the object value. The controller nodes on the bus receive the DSP. Commands sent from the Advant OPC Server for AF100 are "broadcasted" to all nodes with corresponding receiving DSPs. It is only the node with the sending DSP that can send commands to the corresponding objects.

If the Advant OPC Server for AF100 also subscribes for data from the object you should define a sending DSP in the controller.

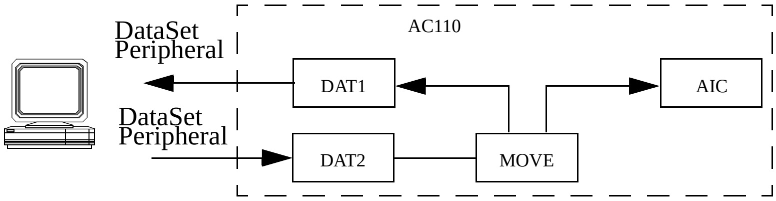


Figure 3-4. Commands sent via DataSet Peripherals

With this solution, you can use all bits of the DAT to map different DAT_DI/DO objects.

NOTE

See Appendix B, DSP Station Number Setting for information how to send DSPs.

When to Use

- When the OPC Client must send commands on a cyclic[1] basis to several objects and you can use MR, MI, MIL, MB (without event communication) or DAT-based objects.

When Not to Use

- When you use the Extended DB elements AIS, AOS, DIS, DOS since these objects use a DSP transferred object status which cannot be written by the Advant OPC Server for AF100 node.
- When several Advant OPC Server for AF100 nodes should be able to change an object value. This cannot be done without additional logic in the controller.
- When you are working with objects that generates events. The Advant OPC Server for AF100 nodes cannot generate events on AF100, it must be done by a controller node.

---

[1] When using SDP to send commands there is a physical limit of eight SDP messages per second. Also note that the Advant OPC Server for AF100 node needs a number of SDP telegrams on a cyclic basis for network supervision.

NOTE

Values could be sent from the Advant OPC Server for AF100 node to a controller which generates events but if the DSP is slow and/or the DSP communication is lost the object value observed in the OPC node might be in a disturbed state (object in alarm state) but without a corresponding alarm.

3.1.1.3 SDP Without DSP Communication

You can use the SDP to read object data without sending the data in a DSP. The SDP will send a read command to the controller and the controller returns the data.

This feature can only be used together with the Extended DB elements MI, MIL and MR and with objects of type MB without event handling.

You can specify that the object only use SDP in the FCB. This is made when you create the object by setting the terminal DSP_COMM=NONE.

When to Use

- When there are no more free DSPs to send data with, the object value is almost static and almost never subscribed for.

NOTE

If possible use DAT-II object instead. This will also reduce the number of DSPs.

When Not to Use

- In all normal use of the system.
- When you must be able to send commands from the Advant OPC Server for AF100 without delay. All outgoing commands will be queued if you read many values with SDP.
- When you have event handling enabled. Because the alarm lists in the OPC client usually subscribe for the object values cyclically at a high rate.

3.1.1.4 Packing and Scaling Values With the DAT-II Objects

In a DSP configuration with value references of type I (DAT-I) you can only use eight value references (objects) per DSP. In a configuration with the DAT-II object type you can pack two integers into each value reference. Each DSP can then send 16 integers (16-bits allow values within the range +/-32768). Each one of these integers can be scaled by one of the following factors [0.001; 0.01; 0.1; 1; 10; 100; 1000] and the scaled result is represented by a floating point value.

This packing and scaling of the value is only supported by the DAT_DAT object.

When to Use

- When you need to transfer a lot of data and need to reduce the amount of DSPs.This is very convenient to use in the APC2 and the AC70 which cannot send more than one DSP_STATION.

3.2 Capacity and Performance

The performance of the Advant OPC Server for AF100 depends on the client application program and the Windows NT system's load. Refer to Section 1.2, Equipment Requirements for recommendations on hardware.

One Advant Fieldbus 100 bus (coax cable) can have up to 80 nodes connected. On Advant Fieldbus 100 with twisted pair up to 32 nodes are possible per segment, several segments may be connected via modems to handle up to 80 nodes.

Always when the system is configured the bus load on the AF 100 must be checked.

The capacity of the Advant OPC Server for AF100 is limited by the CI board capacity. The capacity of the CI board is indicated in Table 3-2 below.

Table 3-2. Advant Fieldbus 100 Interface Capacity

Description	Data
Total no. of DataSet Peripherals	4000
Cycle times depending on configuration in AC100 series	1, 2, 4,... 4096 ms

As each DataSet Peripheral can reference to up to eight DAT elements, the maximum number of DATs is 32 000.

The Advant Fieldbus 100 runs a data rate of 1.5 MBits/sec. Some of the information is, however, used for preambles, cyclic redundancy checks and protocol overhead; as a result, the net data rate is somewhat less.

The transfer times for DataSet Peripherals depend on the number of attached DAT elements (see Table 3-3).

Table 3-3. DataSet Peripheral transfer time

DSP size		Transfer time (ms)
1	DAT element	0.088
2	DAT elements	0.108
3-4	DAT elements	0.156
5-8	DAT elements	0.252

The AF100 bus load has to be calculated when the system is configured. For a complete description of bus load calculation refer to the *Advant Fieldbus 100 User's Guide.* The Bus Configuration Builder in AMPL Control Configuration can also be used to calculate the bus load.

The bus load depends on the DataSet Peripheral configuration and can be calculated using the following formula:

$$BusLoad = \sum\left(\frac{Nbr \cdot Ttr}{cT}\right) \cdot 100$$

This formula provides the bus load as a percentage, where the sum is taken over all different sending DSPs and:

Nbr =number of DSPs (of the same data size and *cT*)
Ttr =transfer time in ms (from Table 3-3)
cT =desired cycle time in ms (1, 2, 4, 8, 16…4096).

In order to guarantee that message transfer is possible, at least 25% of the bus bandwidth is reserved for message transfer (Event Set and command signals). Up to 70% of the bandwidth may be used freely for DataSet Peripheral communication

3.2.1 Compatibility

The Table 3-4 shows compatibility for program versions in different controllers and supported AF100 options.

Table 3-4. Supported options for different controllers

Options	**Controller/Controller version**				
	AC70	**AC110/ ver. 2.0**	**AC110/ ver. 2.1 or later**	**AC160/ ver. 1.0 or later**	**APC2**
Extended DB elements	No	No	Yes	Yes	No
DAT based Objects	Yes	Yes	Yes	Yes	Yes
SDP	Yes	Yes	Yes	Yes	Yes
Event handling	Yes	Yes	Yes	Yes	Yes
AF100/Optical Bus	No(1)	Yes	Yes	Yes	No(1)
AF100/Coaxial Bus	No(1)	Yes	Yes	Yes	Yes
AF100/Twisted Pair Bus	Yes	Yes	Yes	Yes	No(1)

(1) Modems to convert between bus types are available.

3.3 Configuration of System Messages

3.3.1 Settings

Select **Advant | Base | Settings** to start the System Message Configuration Tool.

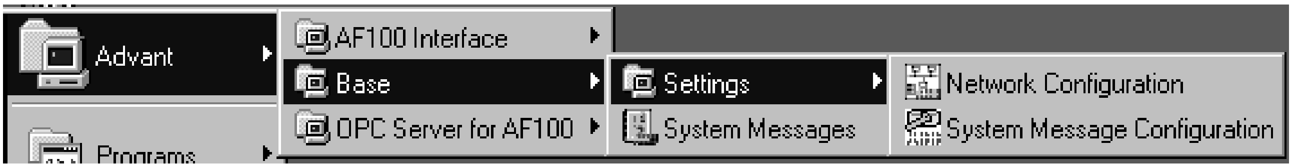
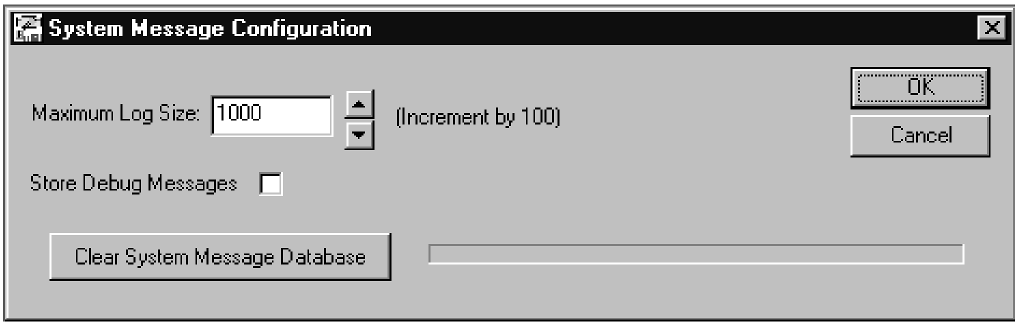


Figure 3-5. Start menu of System Message Configuration Tool.

System Message Configuration

The System Message Configuration dialog box lets you specify the maximum number of system messages to be stored at the same time, that is, the number of messages you can view at any time.

The dialog box also lets you specify whether debug messages shall be stored or not, which is a function intended for service purposes.



Maximum Log Size: 1000 (Increment by 100)

Store Debug Messages ☐

Figure 3-6. System Message Configuration dialog box

- **Maximum Log Size**

  The maximum number of system messages stored at the same time. As you can see in the figure above, the minimum increment is 100 if you use the arrow keys. If you want another value, you can type the number in the text box.

- **Store Debug messages**

Not used for the Advant OPC Server for AF100.

- **Clear System Message Database**

  Click on **Clear System Message Database** if you want to delete all existing messages in the system message database. You have to restart the System Messages Viewer for the change to take effect.

3.4 Configuration of Advant Fieldbus 100 Interface

3.4.1 Properties

The configuration parameters are normally set during installation. They can also be changed by selecting Properties from the Start menu. Select **Advant| AF100 Interface| Diagnostics.**

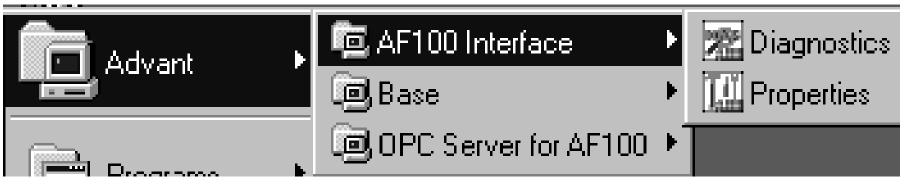


Figure 3-7. Advant Fieldbus 100 Interface start menu

AF100 Interface Properties

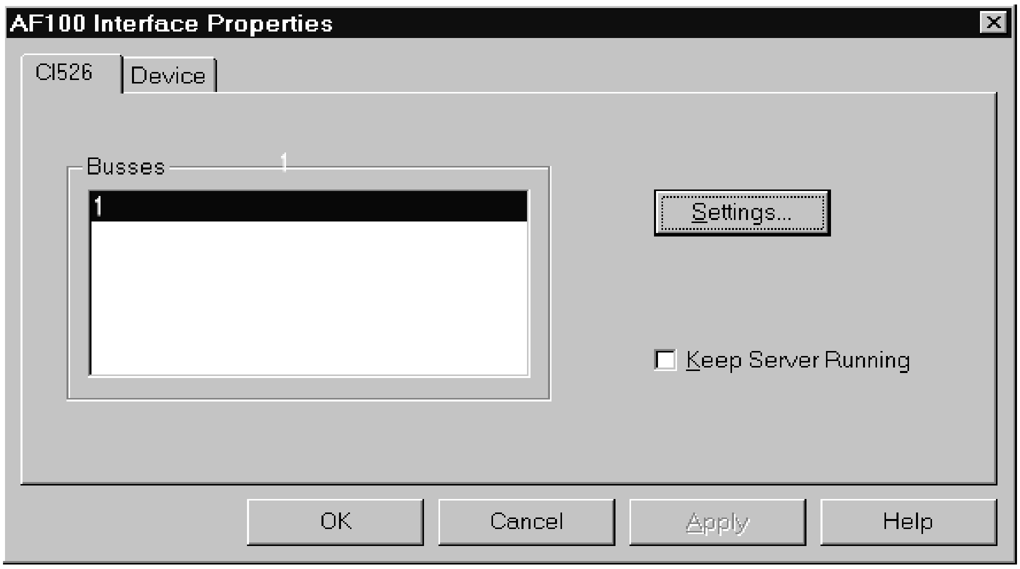


Figure 3-8. Advant Fieldbus 100 Interface properties

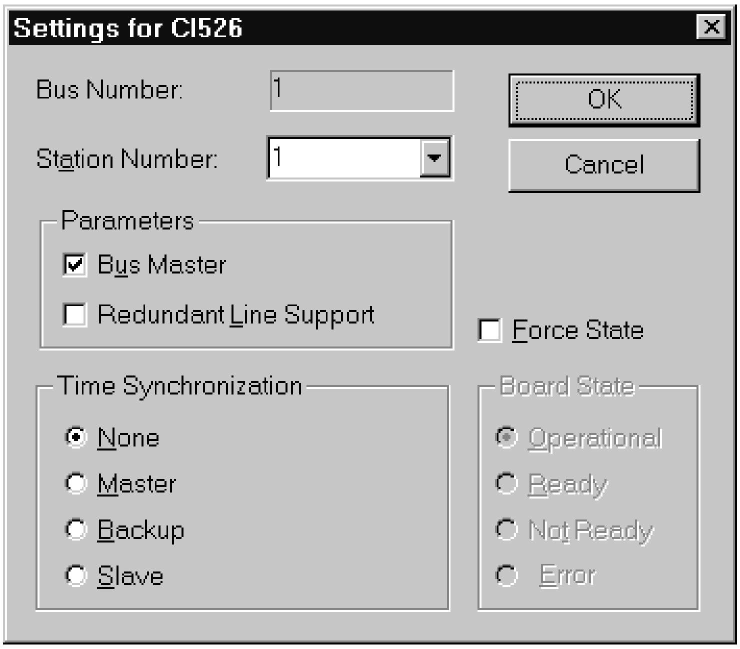
The AF100 Interface Properties shows the Advant Fieldbus 100 busses defined during the installation. By pressing **Settings**, the parameters for the bus can be modified.

- **Keep Server Running**

  This will keep the server software and the CI526V1 board running, even when all client applications have been closed.

  It will ensure a quicker start-up of the OPC-client the second time.

Settings for CI526V1



Settings for CI526

Bus Number: 1

Station Number: 1

Parameters

☑ Bus Master

☐ Redundant Line Support

☐ Force State

Time Synchronization

● None

○ Master

○ Backup

○ Slave

Board State

● Operational

○ Ready

○ Not Ready

○ Error

Figure 3-9. Settings for CI526V1 dialog box

- **Bus Number**

  0 - 255. Normally set during the installation.

- **Station Number**

  The station number has to be within the range 1 - 80 and can not be used by any other station on the bus.

- **Bus Master**

  Bus Master configuration ON or OFF. Normally it should be ON.

- **Redundant Line Support**

  The Redundant Line Support is checked if redundant modems are used.

- **Time Synchronization**

  Time synchronization enables the Advant Fieldbus 100 user to time synchronize all stations connected to the Advant Fieldbus 100 network.
  Possible modes are: None, Master, Backup or Slave.

  None: no time synchronization is performed against the AF100 bus.

Master: the Advant OPC Server for AF100 sends the master time on the AF100 bus (unless another time master is already sending it). The master time is retrieved from Windows NT.

Backup: the Advant OPC Server for AF100 keeps the PC clock synchronized to the AF100 bus time (standby time master). However, if it fails to receive the AF100 bus time DSP within 8s it will automatically switch to master mode. It will stay in Master mode even if the previous time master goes operational. The old time master will automatically go to Backup mode.

Slave: the Advant OPC Server for AF100 keeps the PC clock synchronized to the times sent on the AF100 bus from an other station.

The modes Slave and Backup are only supported if a CI526 or CI526V1 board is used.

Only one station on the AF100 bus may be set to master mode. At most one Advant OPC Server for AF100 may be configured to Backup mode. If a Backup node becomes master or vice versa this is not saved permanently. At restart the Advant OPC Server for AF100 will go back to the original configured time synchronization mode.

- **Force State**

  Only used for test and fault finding.
  Check the Force State check box, if you want to enable manually changes of the board state.

- **Board State**

  The Board State indicates the current mode of the CI526V1 board.
  The board state radio buttons are by default disabled and can not be changed manually, unless the force state check box is selected. However, the board can never be forced into the error state.

  – Operational - the communication board is running

  – Ready - the board is not operational but all configuration remains

  – Not Ready - the board is not operational and the configuration has been cleared

  – Error - the board is passive and not operating properly.

AF100 Interface Properties (device parameters)

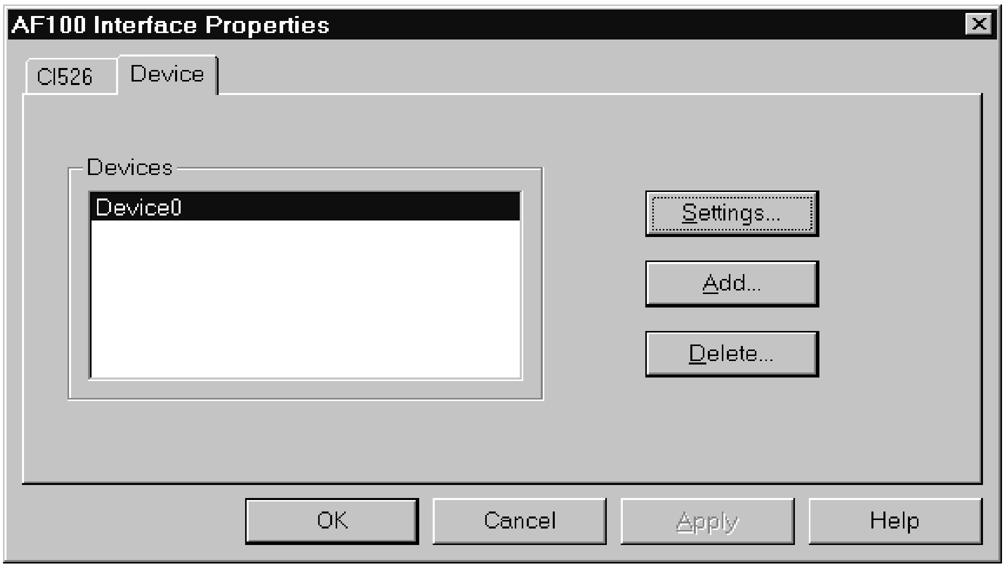


Figure 3-10. Device properties

You can view or modify the current device specific parameters settings for the CI526V1 board by pressing **Settings** or **Add**. These parameters are normally set during the installation.

- **Settings**

  Click on **Settings** to modify the CI526V1 device parameters.

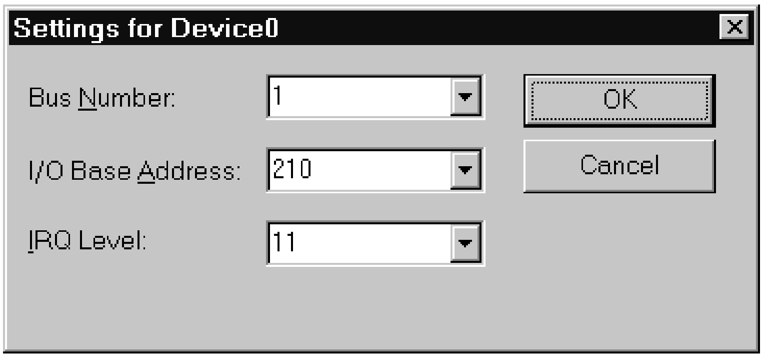
- **Add**

  Click on **Add** to add a new CI526V1 device.

- **Delete**

  Click on **Delete** to remove a CI526V1 device.

Settings for the selected CI526V1 device



Bus Number: 1

I/O Base Address: 210

IRQ Level: 11

Figure 3-11. Settings for the device

- **Bus Number**

  0 - 255. Use the same bus number as you use in the AMPL Control Configuration application.

- **I/O Base Address**

  I/O address used by the CI board. Must be set up according to the CI board strapping. See Chapter 2.2, Installation Procedures for more details.

- **IRQ Level**

  Interrupt level of the CI board. Must be set up according to the CI board strapping and can have the values 3, 10, 11, 12 or 15.
  See the section about CI board strapping and installation in Chapter 2.2, Installation Procedures.

NOTE

Only one CI526V1 board is supported

3.5 Configuration of Advant OPC Server for AF100

The Advant OPC Server for AF100 provides the mandatory OPC Custom interface supporting clients written in a compiled language such as C++. An OPC Server contains several types of objects: OPCServer, OPCGroup and OPCItem. The OPCGroup object provide a way for clients to organize data. For example the group could represent items in a particular display or report. The OPC Items represent connections to data sources within the server. A data item could for example be the value for a specific input signal in the controller.

OPC clients access the Advant OPC Server for AF100 as any other OPC server. The version dependent programmatic identifier (ProgID) for the Advant OPC Server for AF100 is ABB.AF100.1. Specific for the Advant OPC Server for AF100 is the item syntax defined as follows:

<objectname>(.<attribute>)

Examples:

AIS3_5.NAME
AOS5_1.VALUE
DIS1_5.VALUE

The object names used by the Advant OPC Server for AF100 must be unique, which means that all database elements in a FCB project with the terminal MMI_USE = YES must be assigned unique names. Dots are not allowed in object names since a dot is used as separator in the Advant OPC Server for AF100 syntax.

NOTE

It is important to note that FCB sometimes generates default object names containing a dot, e.g MB1.1.These object name must be changed before they can be used in the Advant OPC Server for AF100.

You can find a detailed description of object attributes in Appendix A, Object Attributes, Commands and Events.

3.5.1 Configuration of OPC Server

The Advant OPC Server for AF100 is installed as a Windows NT service and by default assigned to the LocalSystem account which is a predefined account used by system processes. The LocalSystem account is not associated with any logged on user and does not have a domain name, user name or password. One implication of this is, that the Advant OPC Server for AF100 has limited access to network resources such as shared disk drives.

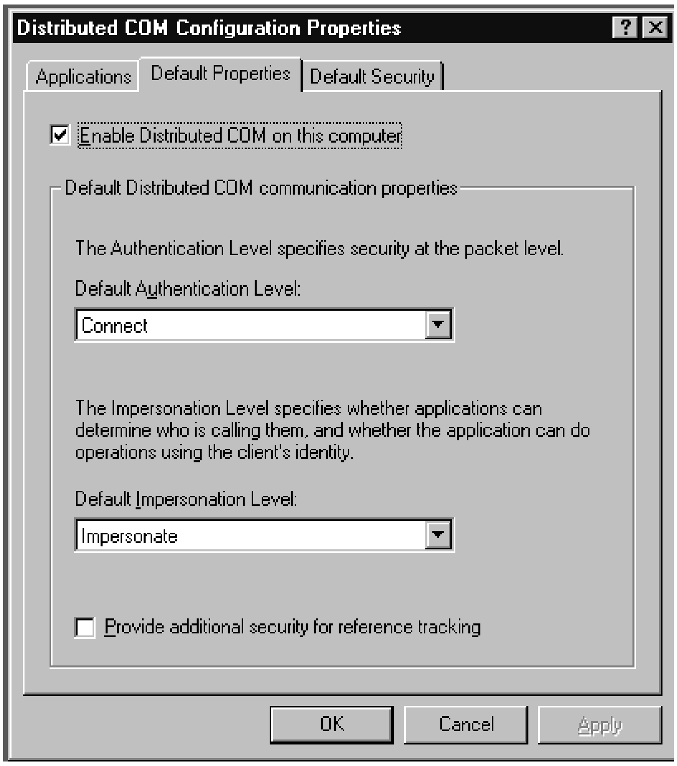
To change the OPC configuration make sure that you log in as a user with administration privileges.

3.5.1.1 Connecting to a remote Advant OPC Server for AF100 using DCOM.

Any OPC compatible client can connect to a remote Advant OPC Server for AF100 using DCOM.

1. The first thing to do is to make sure that the Advant OPC Server for AF100 is properly installed on the remote host machine.
2. Then run DCOMCnfg on the remote host to verify that DCOM is enabled by selecting the checkbox **Enable Distributed COM on this computer** in the **Default Properties page**.

This is done by starting the Run command from the Start menu and write DCOMCnfg in the command window and press OK.



☑ Enable Distributed COM on this computer

Default Distributed COM communication properties

The Authentication Level specifies security at the packet level.

Default Authentication Level: Connect

The Impersonation Level specifies whether applications can determine who is calling them, and whether the application can do operations using the client's identity.

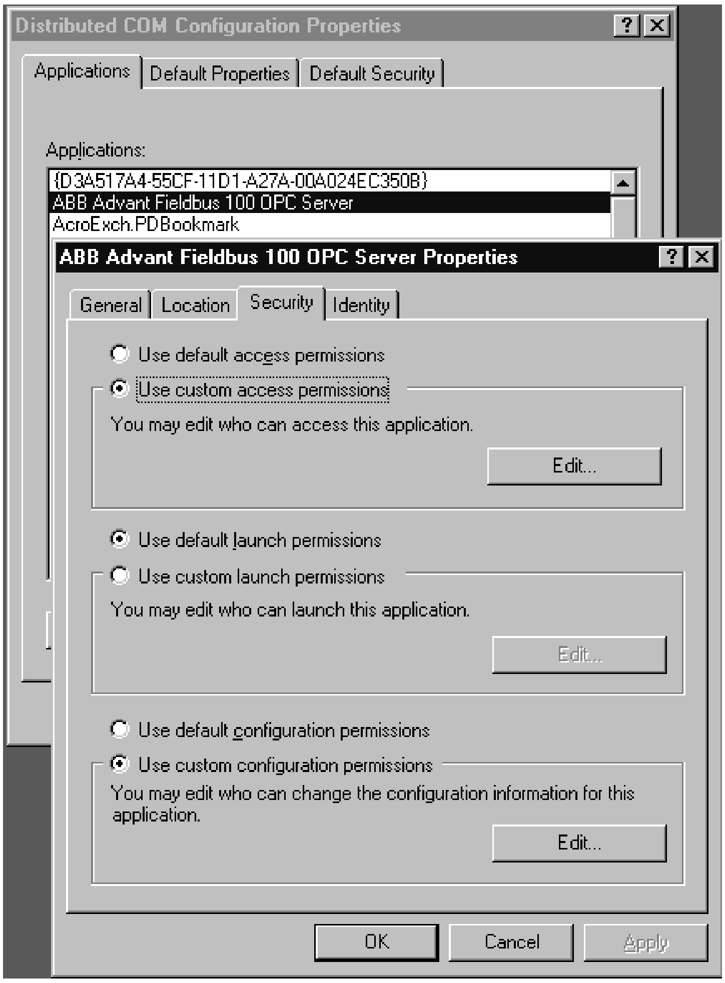
Default Impersonation Level: Impersonate

☐ Provide additional security for reference tracking

Figure 3-12. Distributed COM Configuration Properties

3. Now make sure that the client has permission to launch and access the Advant OPC Server for AF100. Double-click on the **ABB Advant OPC Server for AF100 class** in

Applications page and select **Use custom access permissions** from the **Security page.**


Distributed COM Configuration Properties

Applications | Default Properties | Default Security

Applications:
{D3A517A4-55CF-11D1-A27A-00A024EC350B}
ABB Advant Fieldbus 100 OPC Server
AcroExch.PDBookmark

ABB Advant Fieldbus 100 OPC Server Properties

General | Location | Security | Identity

○ Use default access permissions
● Use custom access permissions
You may edit who can access this application.

○ Use default launch permissions
○ Use custom launch permissions
You may edit who can launch this application.

○ Use default configuration permissions
● Use custom configuration permissions
You may edit who can change the configuration information for this application.

Figure 3-13. Defining custom access permissions

Click on the **Edit** button and add Everyone to the list. Perform the same procedure for launch permissions. Note that this setup is suitable for a low security environment.

4. Copy the OPCServer.reg file available under `C:\Program Files\ABB\Advant\SystemModules\AF100OPCServer\1.1\etc` to the client machine.
5. Edit OPCServer.reg,
   Replace the value PC053480 for the key “RemoteServername” with the name of your server machine.
6. Doubleclick the OPC Server.reg to merge the file into the registry.

7. Copy the OPC Data Access proxy OPCProxy.dll to C:\winnt\system32 on the client machine. Execute **Regsvr32 OPCProxy.dll** to register the proxy.
8. Copy the OPCAlarms & Events proxy opcae_ps.dll to C:\winnt\system32 on the client machine. Execute **Regsvr32 opcae_ps.dll** to register the proxy.
9. Copy the common proxy OPCComn_ps.dll to C:\winnt\system32 on the client machine. Execute **Regsvr32 OPCComn_ps.dll** to register the proxy.
10. Copy the data access automation dll OPCDAAuto .dll to C:\winnt\system32 on the client machine. Execute **Regsvr32 OPCDAAuto .dll** to register the dll.

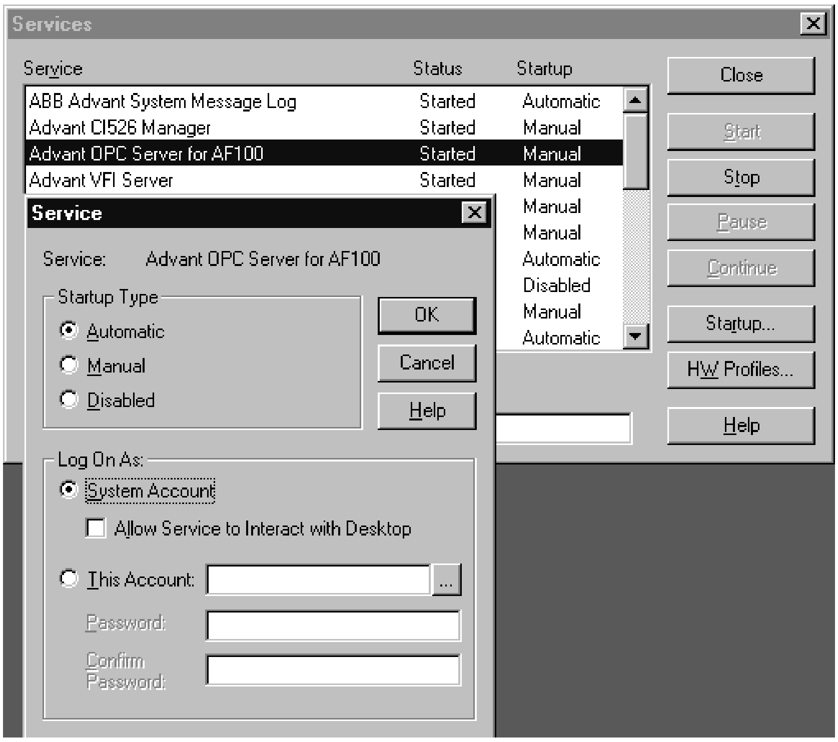
NOTE

For more NT specific information see your NT system documentation.

3.5.1.2 Using a distributed Bus Configuration Database

If the BCD does not reside in the same PC as the Advant OPC Server for AF100, i.e. in a domain environment, it is recommended that a new domain user account is created with access rights to the shared drive. This user must also be granted administrator privileges on the local machine. To configure the Advant OPC Server for AF100 log on as the new user and do the following:

Start the services application from the control panel. Select the ABB Advant Fieldbus 100 Service and click on the Startup button. Click on the This Account radio button and specify the new user name / password.



Service	Status	Startup
ABB Advant System Message Log	Started	Automatic
Advant CI526 Manager	Started	Manual
Advant OPC Server for AF100	Started	Manual
Advant VFI Server	Started	Manual
		Manual
		Manual
		Automatic
		Disabled
		Manual
		Automatic

Service: Advant OPC Server for AF100

Startup Type
● Automatic
○ Manual
○ Disabled

Log On As:
● System Account
☐ Allow Service to Interact with Desktop
○ This Account:
Password:
Confirm Password:

Figure 3-14. Services application window

When the Advant OPC Server for AF100 is started it immediately begins to process the BCD and since the Advant OPC Server for AF100 is started automatically as Windows NT service no interactive users are logged on. This means that no user defined mapping of network drives are available. If a distributed BCD should be used the BCD path must be specified using UNC notation e.g \\Server1\projects.

3.5.2 Settings

You can change the configuration parameters for the Advant OPC Server for AF100 in the AF100 OPC Properties. Select the property page from the start menu: **Advant | OPC Server for AF100 | Properties.**

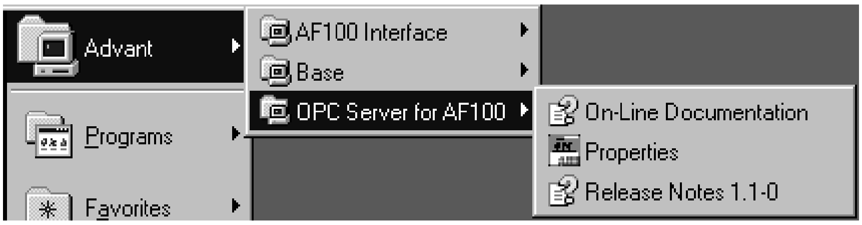
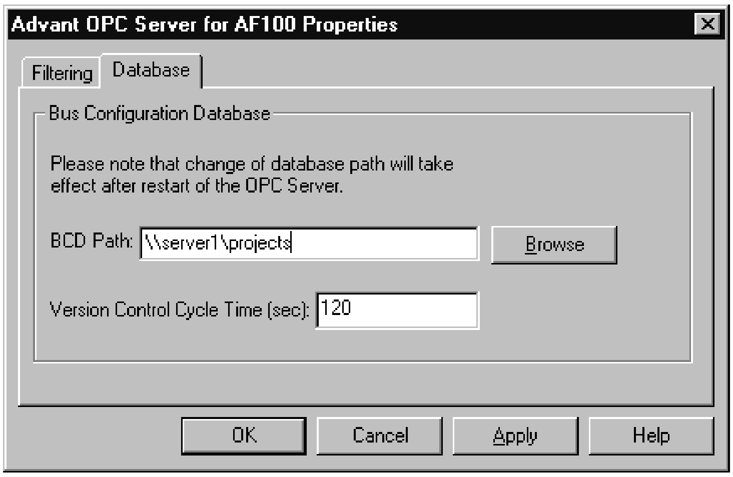


Figure 3-15. Advant OPC Server for AF100 start menu

Advant OPC Server for AF100 Properties


Advant OPC Server for AF100 Properties
Filtering
Database
Bus Configuration Database
Browse
OK
Cancel
Apply
Help

Please note that change of database path will take effect after restart of the OPC Server.

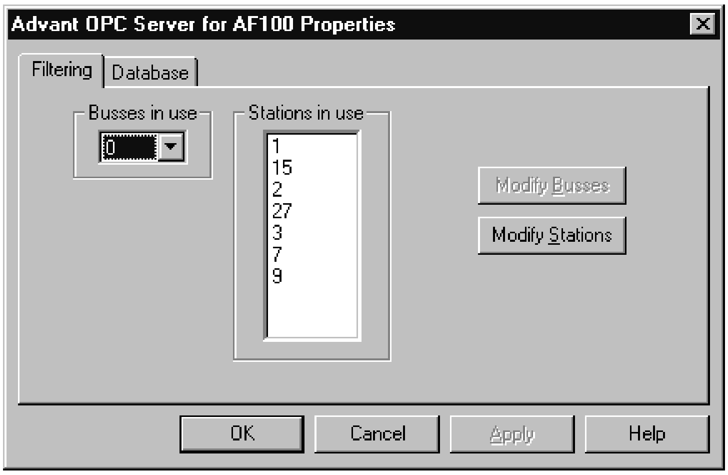
BCD Path: \\server1\projects

Version Control Cycle Time (sec): 120

Figure 3-16. Advant OPC Server for AF100 properties - Database

In the AF100 OPC Properties the following parameters can be changed:

- The path to the Bus Configuration Database and the Version Control Cycle Time.



Busses in use: 0

Stations in use:
1
15
2
27
3
7
9

Figure 3-17. Advant OPC Server for AF100 properties - Filtering

- The node specific filtering of which other nodes on the AF100 bus that shall be reachable from the OPC Server.

3.5.3 Tutorial

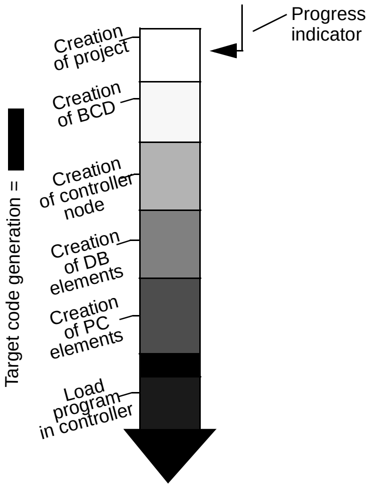
3.5.3.1 Creating a Small Test Configuration Using Extended DB Elements

By following the steps in this tutorial, you will create a small basic application that you can use to test whether the Advant OPC Server for AF100 is up and running after the installation procedure is completed. You may also find it useful to consult *AMPL Configuration Advant Controller 100 Series Reference Manual*, *Bus Configuration Builder User's Guide* and *Function Chart Builder User's Guide*.

To carry out this tutorial, the following applications and hardware must be installed and working:

- Advant OPC Server for AF100 version 1.1
- AMPL Control Configuration version 1.6, including Application Builder, Function Chart Builder and Bus Configuration Builder.
- One AC110 controller version 2.1 or later with, at least, the Extended PC 2.1 (OPT 1) and Events 2.1 (OPT3) options installed.

This tutorial assumes that this is a new installation with no previous node or network configuration. During the tutorial, a “procedure bar” is placed at strategic positions, indicating where in the procedure the tutorial is at a given moment.



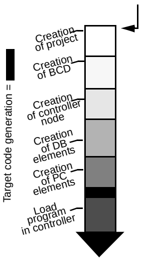


Figure 3-18. Procedure bar used in the tutorial

Creating a new project

1. Start the Application Builder program by choosing **Advant | Engineering | Application Builder** from the start menu.

2. Select the **New | Project** item in the **File** menu.

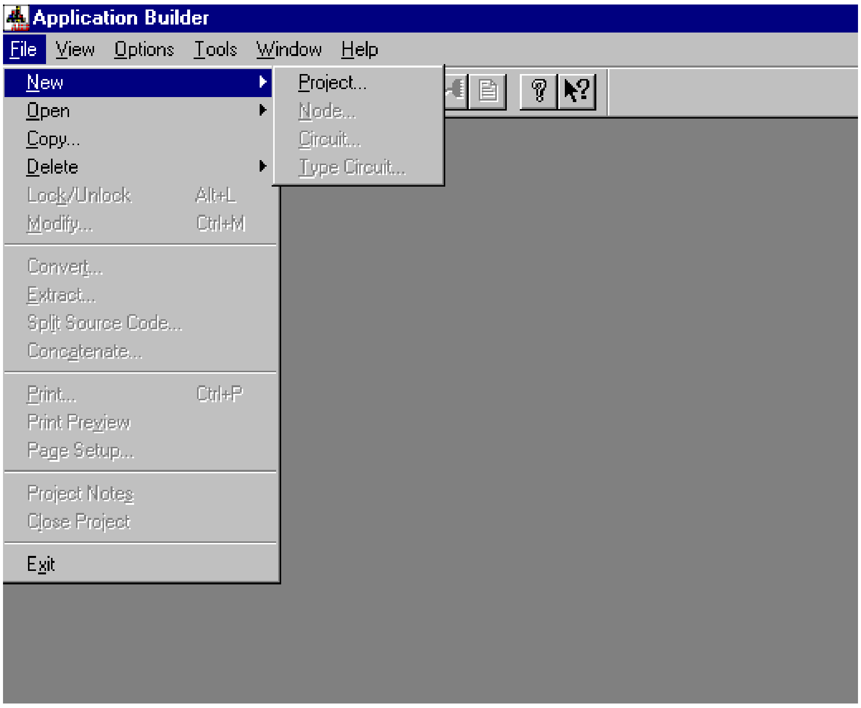
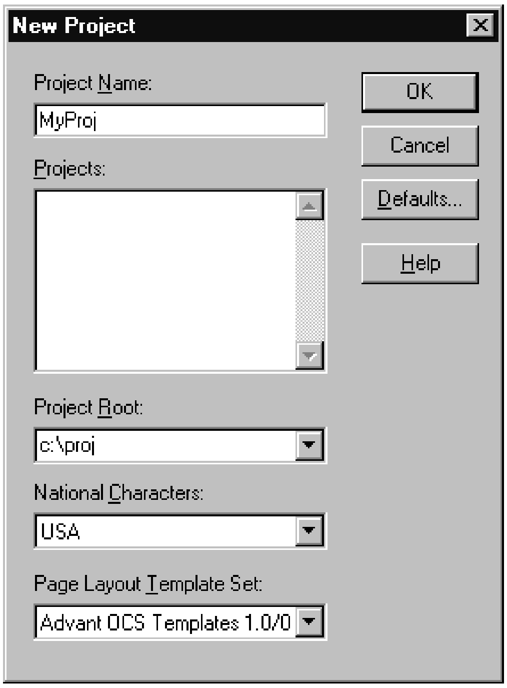


Figure 3-19. Application Builder start window

A dialog box is displayed


New Project

Project Name: MyProj

Projects:

Project Root: c:\proj

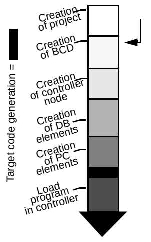
National Characters: USA

Page Layout Template Set: Advant OCS Templates 1.0/0

Figure 3-20. New Project dialog box

3. In the Project Name field, fill in following information.
4. Set Project Name to **`Myproj`**
5. Set Project Root to **`C:\proj`** (or as appropriate).
6. Click OK.
7. Three windows are displayed:
   - – The Node List window
   - – The Circuit List window
   - – The Type Circuit List window.

   These windows show the configuration done so far for the selected project. For a new project, as in this tutorial, no information is presented in the windows.



Creating a Bus Configuration Database

8. Start the Bus Configuration Builder (BCB) from the **Tools** menu in the Application Builder.

9. A start-up dialog box called Select Environment is displayed. Select the environment to work in, by choosing the Bus Configuration Builder and click **OK**.

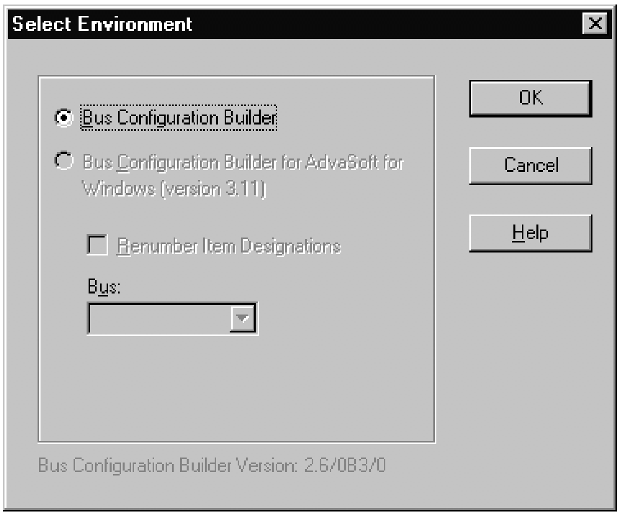

Select Environment
● Bus Configuration Builder
○ Bus Configuration Builder for AdvaSoft for Windows (version 3.11)
☐ Renumber Item Designations
Bus:
OK
Cancel
Help
Bus Configuration Builder Version: 2.6/0B3/0

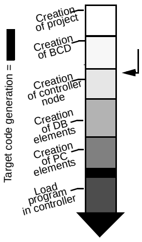
Figure 3-21. Select environment

10. As this is a new project there is no Bus Configuration Database created yet, and you will get the question if you want to create one. Click **Yes**.

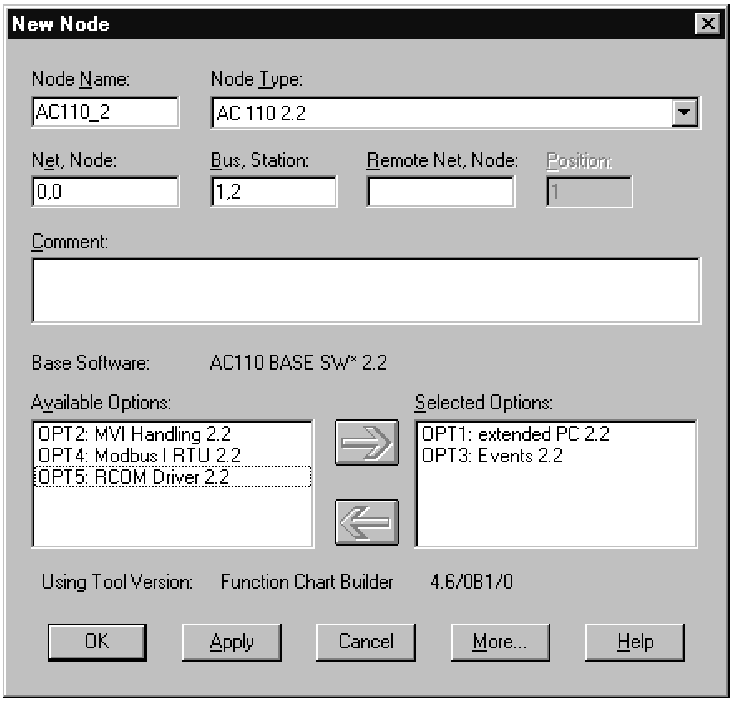
11. The BCB application window is displayed, and an empty Bus Configuration Database (BCD) has been created. Leave the BCB by choosing **Exit** from the **File** menu.

Creating a new controller node

12. Return to the Application Builder and select the **New | Node** item from the **File** menu.



A dialog box is displayed (all fields are empty by default):



Node Name: AC110_2
Node Type: AC 110 2.2
Net, Node: 0,0
Bus, Station: 1,2
Remote Net, Node:
Position: 1
Comment:
Base Software: AC110 BASE SW* 2.2
Available Options:
- OPT2: MVI Handling 2.2
- OPT4: Modbus I RTU 2.2
- OPT5: RCOM Driver 2.2

Selected Options:
- OPT1: extended PC 2.2
- OPT3: Events 2.2

Using Tool Version: Function Chart Builder 4.6/0B1/0

Figure 3-22. An example of a filled-in New Node dialog box

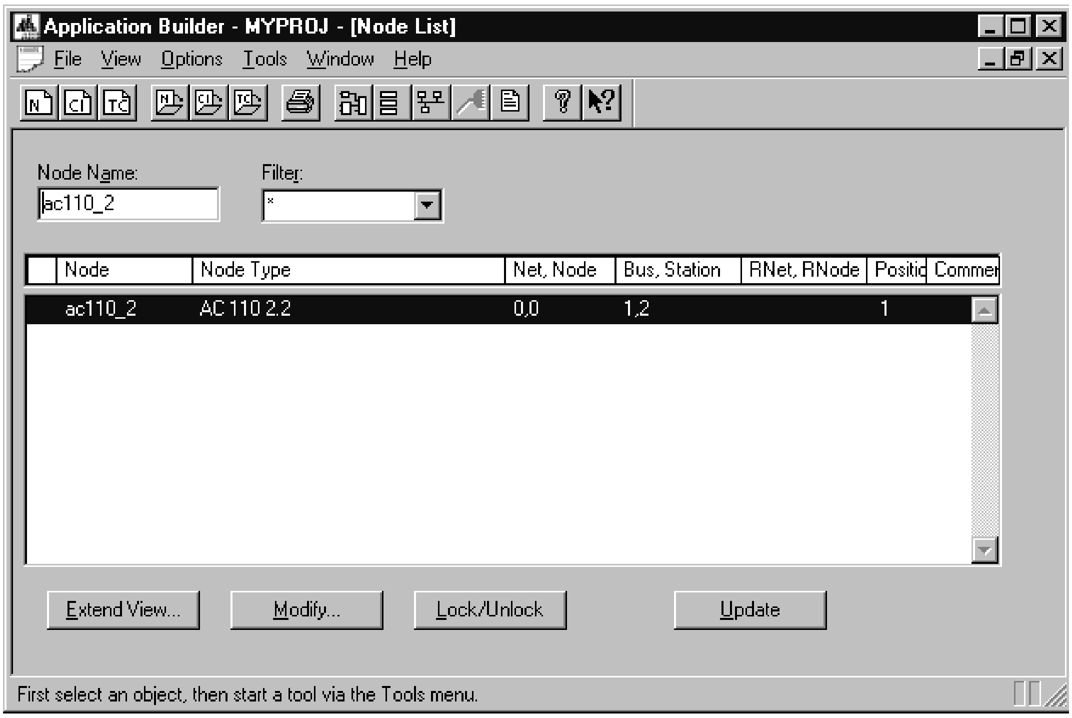
13. In the New Node dialog box, fill in following information.
    - Set Node Name as appropriate (AC110_2).
    - Set Node type to AC110 with the version number of the controller.
    - Set Net, Node to 0,0.
    - Set Bus, Station as appropriate (1,2).

NOTE

The setting for the bus number must be the same as the setting used for the Advant OPC Server for AF100 with which the controller is to communicate. The bus number for the Advant OPC Server for AF100 is normally set during the installation of the AF100 Interface (see Section 3.4.1, Properties). The station number must correspond with the station number setting in the controller.

14. Select all options that are supported by the target system.
15. Click **OK**.

The Node List dialog is displayed, updated with the newly created controller node listed among the other items in the list box.



Node Name: ac110_2

Filter: *

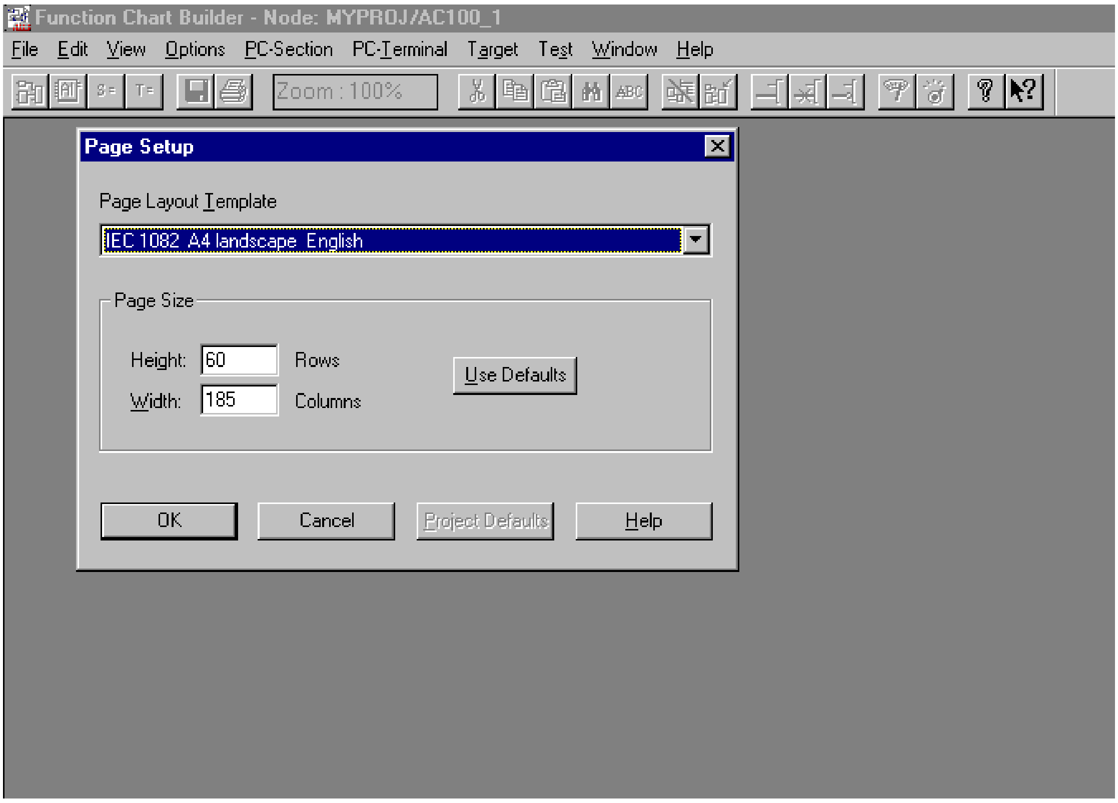
	Node	Node Type	Net, Node	Bus, Station	RNet, RNode	Positic	Commen
	ac110_2	AC 110 2.2	0,0	1,2		1	

First select an object, then start a tool via the Tools menu.

Figure 3-23. Nodes created in the project

16. Select the new controller node by marking it in the list box and choose the **Function Chart Builder** item from the **Tools** menu in the Application Builder.

17. The Function Chart Builder application is thereby started. During the start-up sequence, you are asked to define the page layout for your diagrams (for example A4, landscape English):



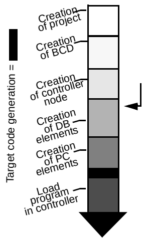
Page Layout Template: IEC 1082 A4 landscape English

Page Size

Height: 60 Rows

Width: 185 Columns

Figure 3-24. Define page layout for your diagrams



18. Choose an appropriate page size, and click **OK**

Building the controller application

19. When the start-up sequence is complete, a dialog with the program sections is displayed:

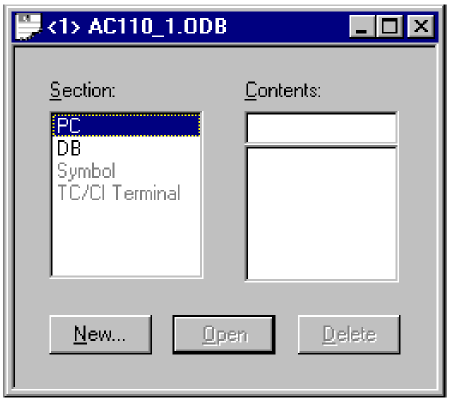
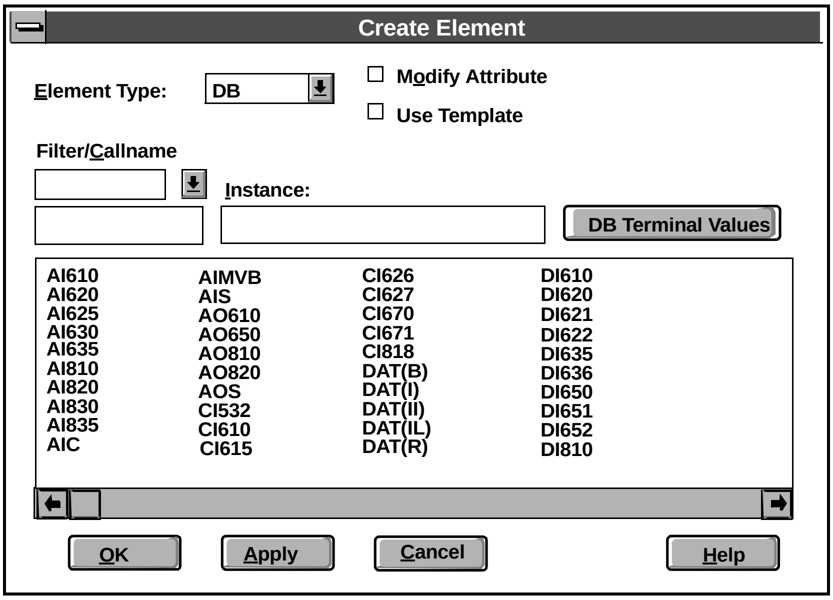


Figure 3-25. Choose program section

20. Select **DB** and click **New**, or choose **New Section | DB** from the **File** menu in the FCB menubar.

21. The Create Element dialog box is displayed:

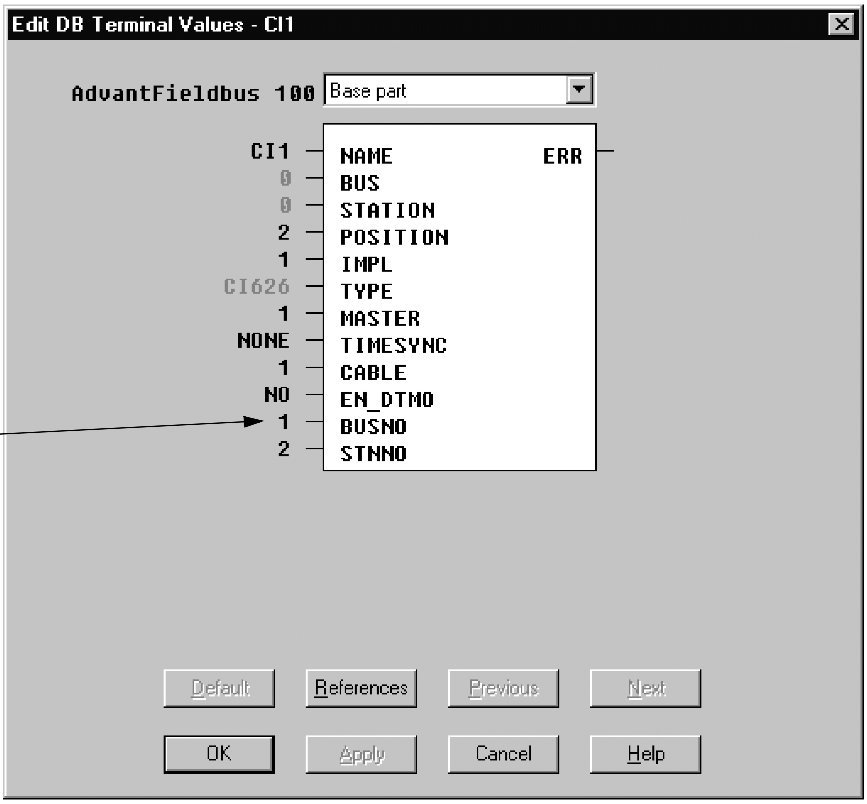


Element Type: DB

Figure 3-26. Create Element dialog, DB element version

22. In the list box, mark the database element describing the communication interface, **CI626** (or higher, depending on the hardware in the controller). Click the **DB Terminal Values** button.

The Edit Db terminal Values - CI1 dialog is displayed.



Edit DB Terminal Values - CI1

AdvantFieldbus 100 Base part

CI1	NAME	ERR
0	BUS	
0	STATION	
2	POSITION	
1	IMPL	
CI626	TYPE	
1	MASTER	
NONE	TIMESYNC	
1	CABLE	
NO	EN_DTMO	
1	BUSNO	
2	STNNO	

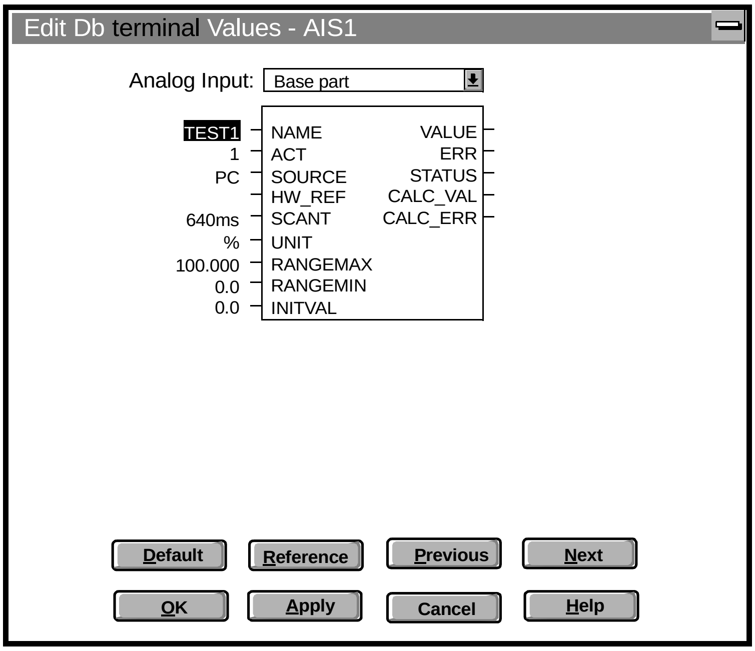
Note that the default bus number is zero. In this tutorial we will set the bus number to one.

Figure 3-27. Edit Terminal Values dialog

23. Fill in following information:
24. Set the bus and station numbers.
25. Click **OK**.
26. When you return to the Create Element dialog box click **Apply**.
27. In the list box in the Create Element dialog box, mark the database element describing the processor module of the controller, **PM632** (or higher, depending on the hardware).Click the **DB Terminal Values** button.
28. Set the With_bat item to appropriate value depending on the hardware. 1 if the controller is equipped with battery backup, 0 if not. Click **OK**.
29. When you return to the Create Element dialog box click the **Apply** button.

30. Create a test signal of the Analog Input type. In the list box, mark (click on) the **AIS** item and--this is important--click the **DB Terminal Value** button.

    The Edit Db terminal Values - AIS1 dialog box is displayed.



Edit Db terminal Values - AIS1

Analog Input: Base part

TEST1 NAME
1 ACT
PC SOURCE
HW_REF
640ms SCANT
% UNIT
100.000 RANGEMAX
0.0 RANGEMIN
0.0 INITVAL

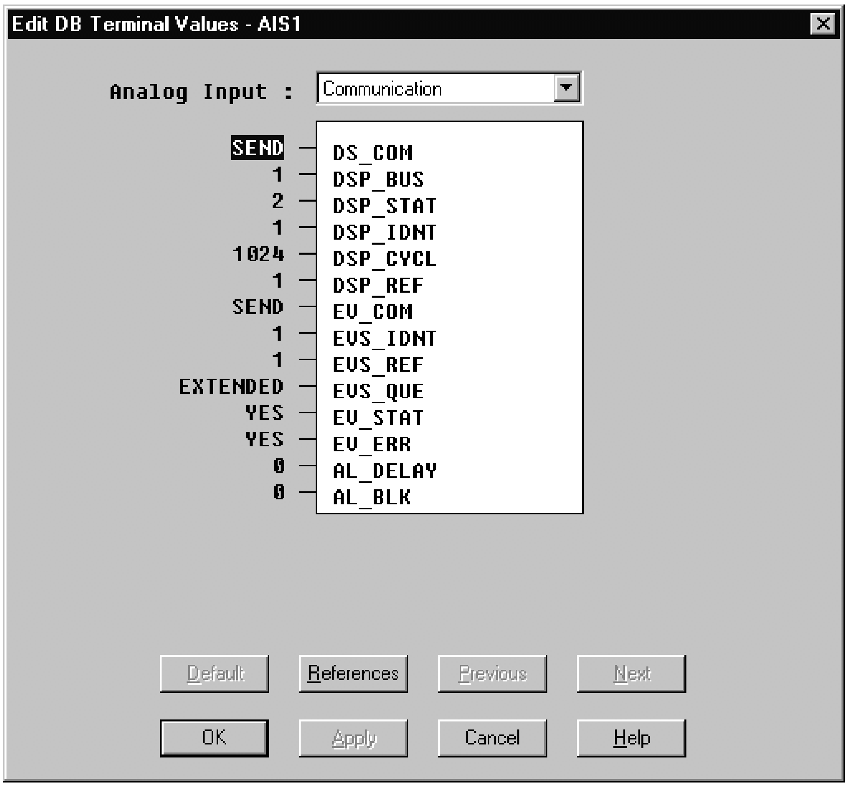
Figure 3-28. Edit Terminal Values dialog

31. Fill in following information:

    Set the Name item to an appropriate object name (TEST1).

32. Choose the Communication item from the Analog Input drop-down list.

The parameter listing is updated with communication specific items:



Analog Input : Communication

SEND — DS_COM
1 — DSP_BUS
2 — DSP_STAT
1 — DSP_IDNT
1024 — DSP_CYCL
1 — DSP_REF
SEND — EV_COM
1 — EVS_IDNT
1 — EVS_REF
EXTENDED — EVS_QUE
YES — EV_STAT
YES — EV_ERR
0 — AL_DELAY
0 — AL_BLK

Figure 3-29. Edit Terminal Values dialog, second part

NOTE

The DSP_STAT and DSP_IDNT parameters explicitly identify a certain DataSet Peripheral. It is imperative that two DSPs with identical DSP_STAT and DSP_IDNT settings do not exist in the system. No checks are made for identical DSPs in other controllers when a new one is created. It is recommended that you run the BCB application to avoid identical DSPs in your system.

33. Fill in following information:

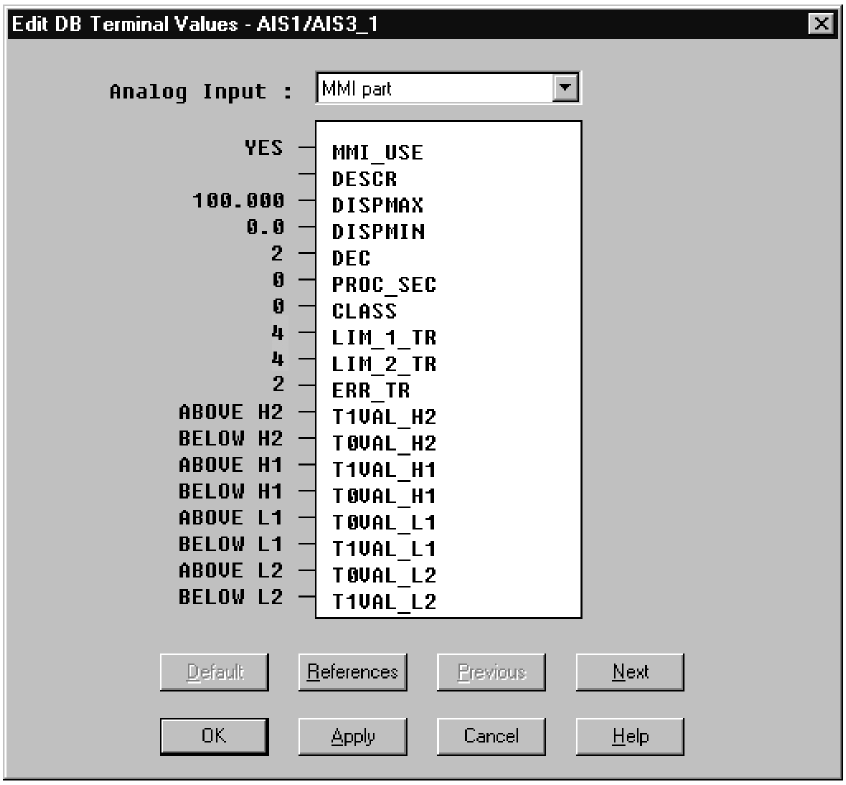
    Set the DS_COM item to SEND.

    Set the DSP_BUS item to the actual bus number (1).

    Set the DSP_STAT item to the actual station number (2).

34. Choose the MMI Part item from the Analog Input drop-down list.

The parameter listing is updated with MMI specific items:



Edit DB Terminal Values - AIS1/AIS3_1

Analog Input : MMI part

YES	MMI_USE
	DESCR
100.000	DISPMAX
0.0	DISPMIN
2	DEC
0	PROC_SEC
0	CLASS
4	LIM_1_TR
4	LIM_2_TR
2	ERR_TR
ABOVE H2	T1VAL_H2
BELOW H2	T0VAL_H2
ABOVE H1	T1VAL_H1
BELOW H1	T0VAL_H1
ABOVE L1	T0VAL_L1
BELOW L1	T1VAL_L1
ABOVE L2	T0VAL_L2
BELOW L2	T1VAL_L2

Figure 3-30. Edit Terminal Values dialog, third part

35. Fill in the following information:
Set the MMI_USE to YES.
Set LIM_1_TR to 4, LIM_2_TR to 4 and ERR_TR to 2.

NOTE

If a the treat is set to zero, no OPC-events will be reported to the client.

Treat=0	The event is never reported to the OPC client
Treat=1	The ACK_REQ flag will be cleared(EVENT)

For more detailes, or information of howto set the treats for other object types see the Data Base Elements Reference manual for the Advant Controller 100 Series.

The following values can not be entered by the ACC:

- The TREAT (VALUE and ERROR) terminals for DAT_AI objects are by default set to 4.
- The LIM1_TREAT terminal for AOS objects are by default set to 3.
- The VALUE_TREAT terminal for DAT_DI objects is reused for the ERROR_TREAT.

See Appendix C, Alarms and Events for information how to change Alarm and Events descriptions.

NOTE

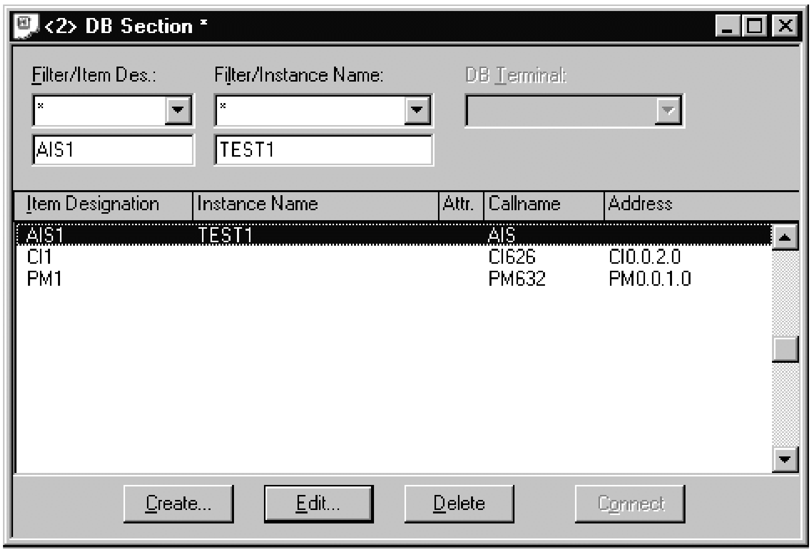
The OPC Standard uses severity on alarms and events. For details how to change the default values, see Appendix C, Alarms and Events.

36. Click the **OK** button.

    You return to the Create Element dialog.

    - Click the **OK** button in the Create Element dialog box.

    During the last four steps, the DB Section dialog box is updated continuously according to your selections.



<2> DB Section *

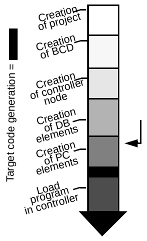
Filter/Item Des.: * AIS1

Filter/Instance Name: * TEST1

Item Designation	Instance Name	Attr.	Callname	Address
AIS1	TEST1		AIS	
CI1			CI626	CI0.0.2.0
PM1			PM632	PM0.0.1.0

Figure 3-31. DB Section dialog box

]



37. Choose **New Section | PC** from the **File** menu in the Function Chart Builder menubar, or select **PC** and click **New** in the window named AC110_2.ODB as shown in the figure.

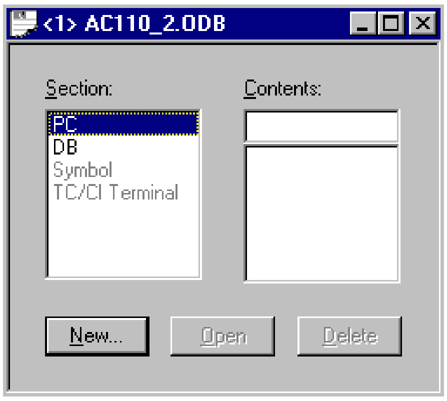
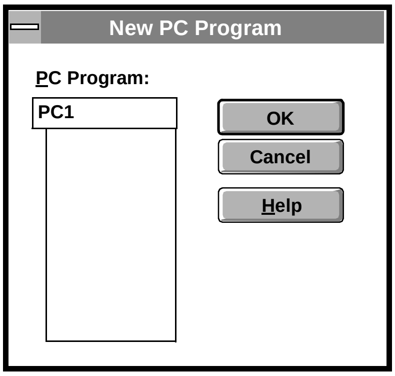


Figure 3-32. Choose PC section

The New PC Program dialog box is displayed:



PC Program: PC1

Figure 3-33. New PC Program dialog box

38. Fill in the name of your new PC program (PC1) as shown it the figure above and click **OK**

39. The Create Element dialog box is displayed.

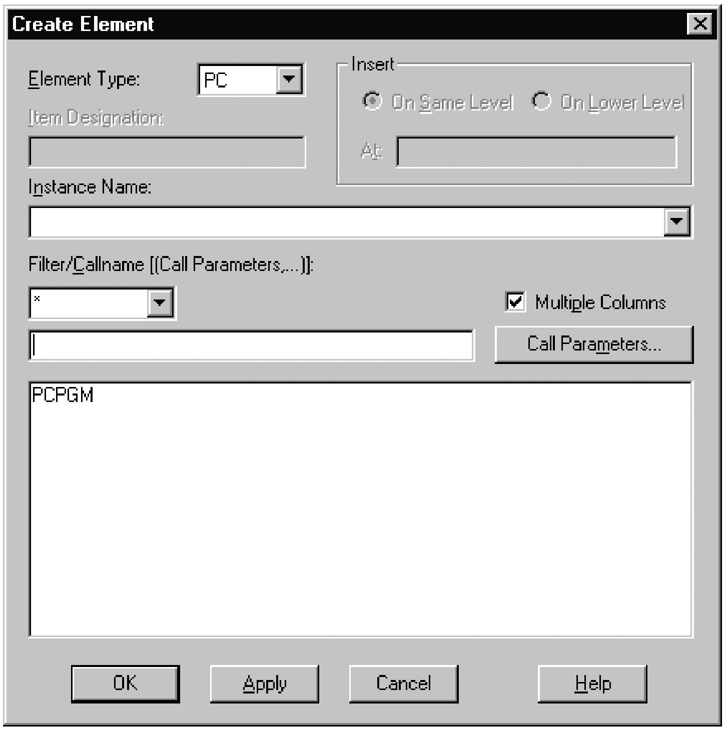
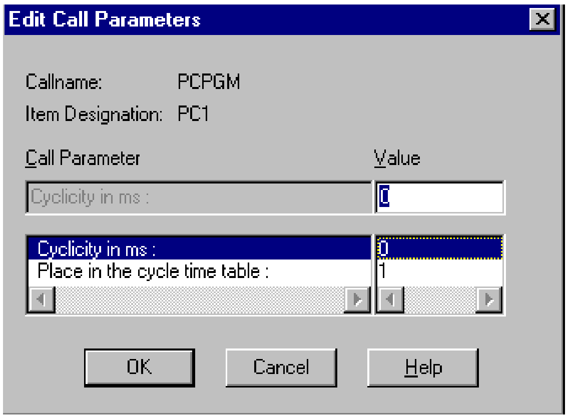


Figure 3-34. Create Element dialog box

40. Click on the PCPGM item in the list box.
41. Click the **Call Parameter** button.

42. The Edit Call Parameters dialog box is displayed.



Edit Call Parameters

Callname: PCPGM

Item Designation: PC1

Call Parameter	Value
Cyclicity in ms :	0
Place in the cycle time table :	1

Figure 3-35. Edit Call Parameters

43. Fill in the cyclicity time, for example, 100 ms, in the displayed dialog and click **OK**.

    You return to the Create Elements dialog box.

44. Click the **Apply** button.

    A chart showing the items created as a result of the steps above is displayed .

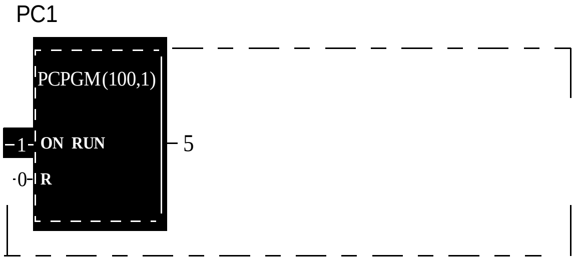
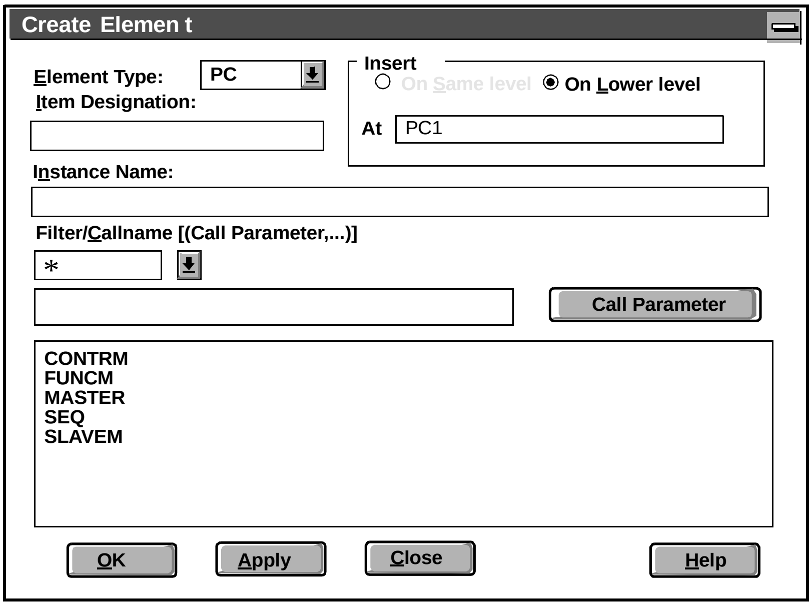


Figure 3-36. Example of the chart displayed after inserting the PCPGM element

The Create Element dialog is updated with a new set of parameters in the list box:



Element Type: PC

Item Designation:

○ On Same level ● On Lower level

At PC1

Instance Name:

Filter/Callname [(Call Parameter,...)]

*

CONTRM
FUNCM
MASTER
SEQ
SLAVEM

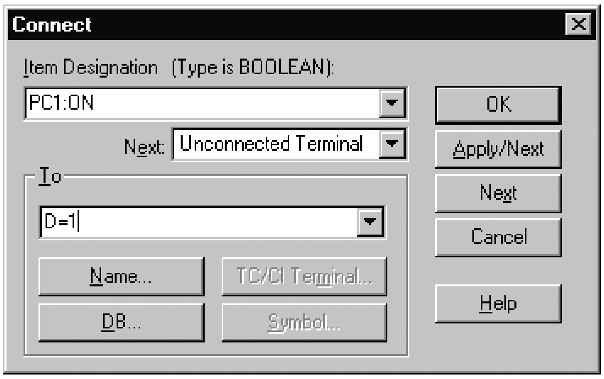
Figure 3-37. Create Element dialog, second part

45. Mark the CONTRM item in the list box.
46. Click the **Call Parameter** button.
47. Fill in the cyclicity time, for example, 500 ms, in the displayed Edit Call Parameters dialog box and click **OK**.

    You return to the Create Elements dialog box.
48. Click the **Apply** button.

    The chart showing the configured program elements is updated with the CONTRM item.
49. Click the **Close** button in the Create Elements dialog box.
50. In the Function Chart Builder application, activate the Chart window (PC Section - PC1) and click on the 1 connection, belonging to the PCPGM item, to mark it.

51. Choose the **Connec**t item from the **PC-Terminal** menu in the Function Chart Builder menubar.



Item Designation (Type is BOOLEAN): PC1:ON
Next: Unconnected Terminal
To: D=1

Figure 3-38. Connect dialog

52. Fill in the following in the displayed dialog:

    in the To section **`D=1`**
    and click the **Apply/Next** button.
    Fill in **`D=0`**
    click the **Apply/Next** button
    click the **Next** button
    Fill in **`D=1`**
    click the **Apply/Next** button
    Fill in **`D=0`**
    click the **Apply/Nex**t button
    Fill in **`D=0`**
    click the **OK** button.

After this procedure, the chart should look like this:

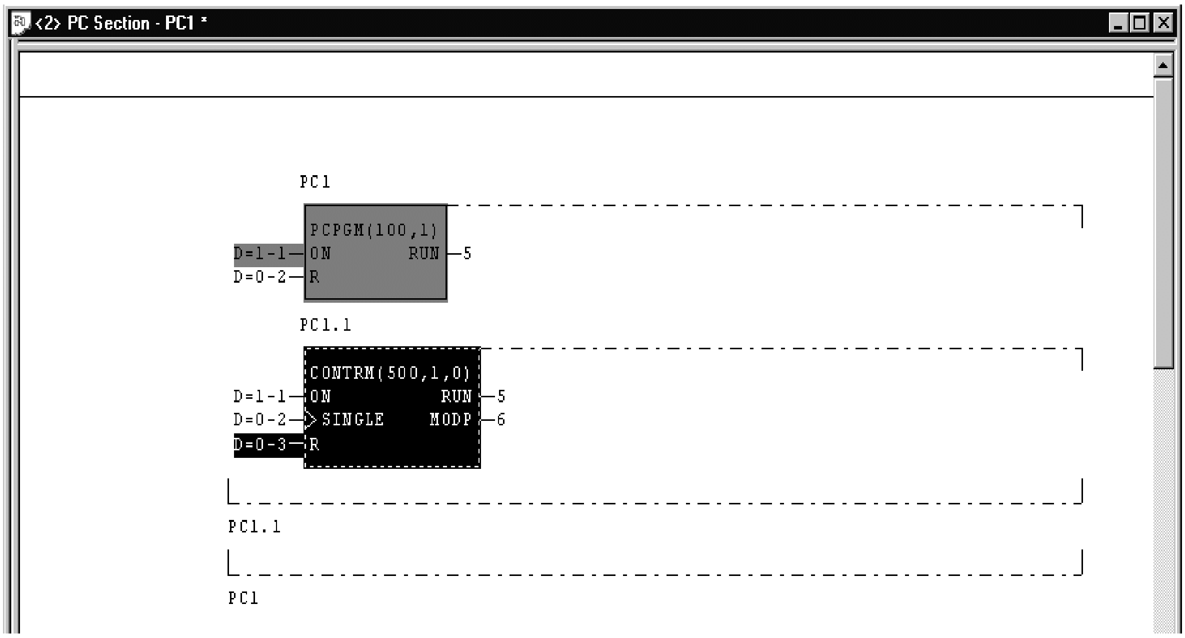
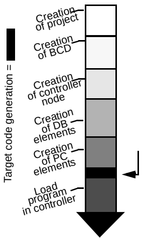


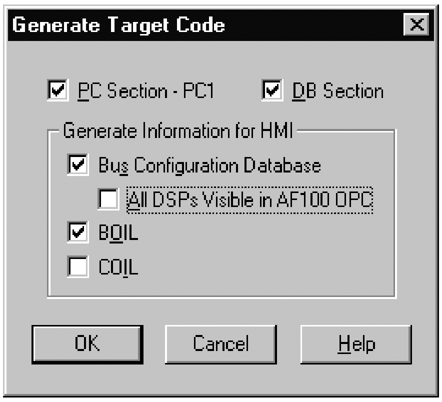
Figure 3-39. Chart after the connection procedure

53. Choose the **Save** item from the **File** menu in Function Chart Builder menubar to save the configuration.

Compiling the controller application and filling the Bus Configuration Database



54. You are still in the Function Chart Builder application. Choose **Generate Target Code** from the **File** menu.



Generate Target Code

☑ PC Section - PC1 ☑ DB Section

Generate Information for HMI

☑ Bus Configuration Database

☐ All DSPs Visible in AF100 OPC

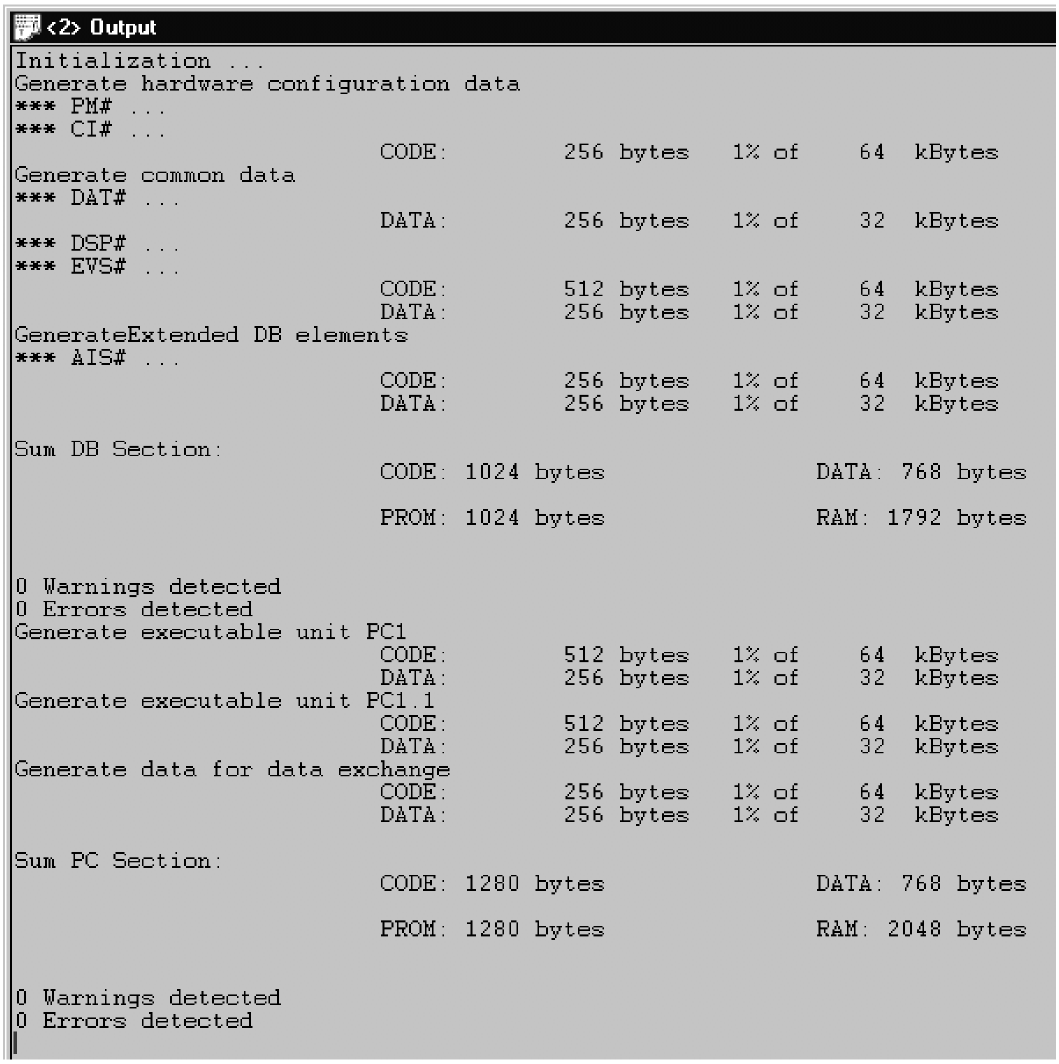
☑ BOIL

☐ COIL

Figure 3-40. Generate Target Code dialog box

Select all three check boxes in the Generate Target Code dialog box.

Your application is compiled and data is written to the Bus Configuration Database. Brief information about the compiling procedure is displayed.



```
Initialization ...
Generate hardware configuration data
*** PM# ...
*** CI# ...
                          CODE:        256 bytes   1% of    64  kBytes
Generate common data
*** DAT# ...
                          DATA:        256 bytes   1% of    32  kBytes
*** DSP# ...
*** EVS# ...
                          CODE:        512 bytes   1% of    64  kBytes
                          DATA:        256 bytes   1% of    32  kBytes
GenerateExtended DB elements
*** AIS# ...
                          CODE:        256 bytes   1% of    64  kBytes
                          DATA:        256 bytes   1% of    32  kBytes

Sum DB Section:
                          CODE: 1024 bytes               DATA: 768 bytes

                          PROM: 1024 bytes               RAM: 1792 bytes


0 Warnings detected
0 Errors detected
Generate executable unit PC1
                          CODE:        512 bytes   1% of    64  kBytes
                          DATA:        256 bytes   1% of    32  kBytes
Generate executable unit PC1.1
                          CODE:        512 bytes   1% of    64  kBytes
                          DATA:        256 bytes   1% of    32  kBytes
Generate data for data exchange
                          CODE:        256 bytes   1% of    64  kBytes
                          DATA:        256 bytes   1% of    32  kBytes

Sum PC Section:
                          CODE: 1280 bytes               DATA: 768 bytes

                          PROM: 1280 bytes               RAM: 2048 bytes


0 Warnings detected
0 Errors detected
```

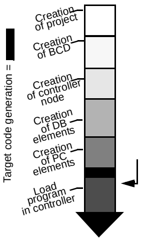


Figure 3-41. Ex.of the information displayed after a completed DB target code generation

Downloading to controller

55. Choose the **Connect** item from the **Target** menu in the Function Chart Builder application.

A dialog is displayed with various connection alternatives. In the case of a totally new AF100 Interface installation and a totally new controller, use a serial communication line. Select the appropriate COMx alternative (depending on which port you are using) and click **OK**. You can use the AF100 alternative in all future application program download operations.

After connection you get a report about the status of the connected controller in the Status Report window.

56. Choose **Load Application** from the **Target** menu.

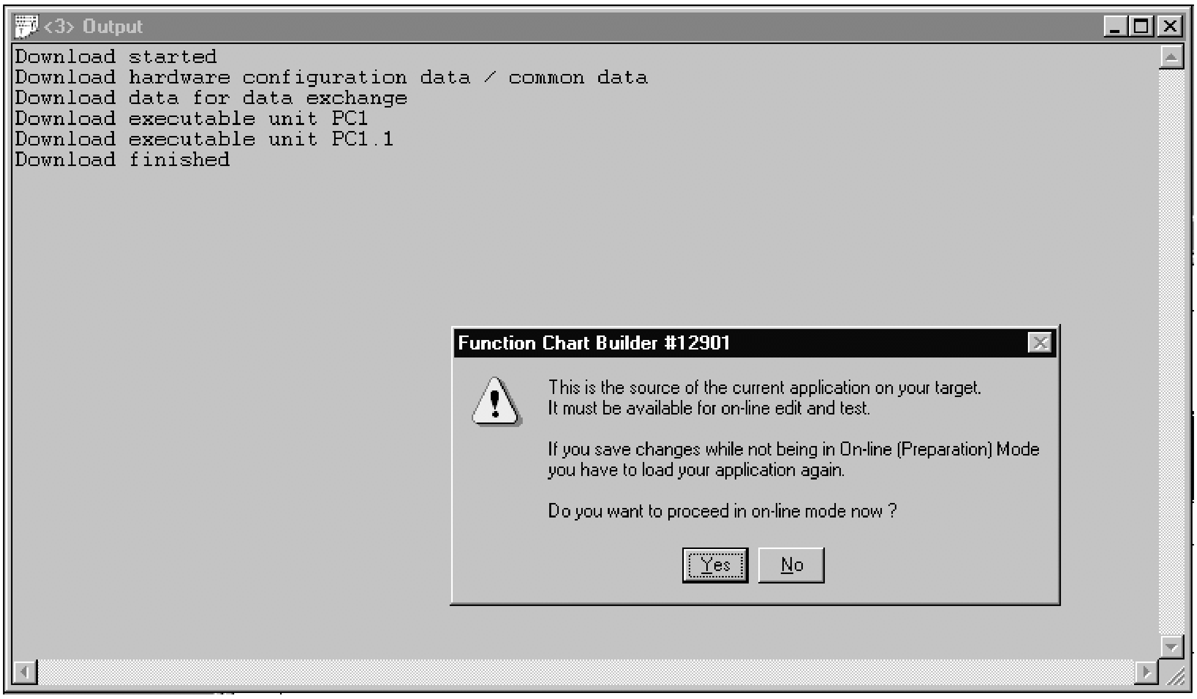
The Function Chart Builder displays some messages about the program loading procedure’s progress.
When updating an application that has previously been loaded in the controller you must first BLOCK PROGRAM.

NOTE

A dialog box is displayed and you are asked to confirm the downloading. Press **Y** on the keyboard for Yes, or use the arrow keys to mark the Yes alternative and then press the **Enter** key.

The Function Chart Builder displays some messages about the program loading procedure´s progress.

Answer the question “Do you want to proceed in on-line mode now?“ with **No**.



```
Download started
Download hardware configuration data / common data
Download data for data exchange
Download executable unit PC1
Download executable unit PC1.1
Download finished
```

This is the source of the current application on your target.
It must be available for on-line edit and test.

If you save changes while not being in On-line (Preparation) Mode you have to load your application again.

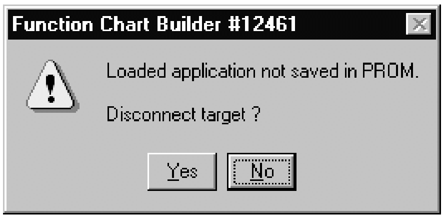
Do you want to proceed in on-line mode now ?

Figure 3-42. Download of application

57. Choose the **Deblock Program** item from the **Target** menu.
58. Exit the Function Chart Builder application by choosing **File | Exit**.

    A dialog is shown which asks if you want to disconnect from the target system. Enter Y for Yes.

59. A dialog is displayed which states that the program is not saved in the PROM. Saving in the PROM is not necessary for this tutorial, so enter Y for Yes.



Function Chart Builder #12461

Loaded application not saved in PROM.

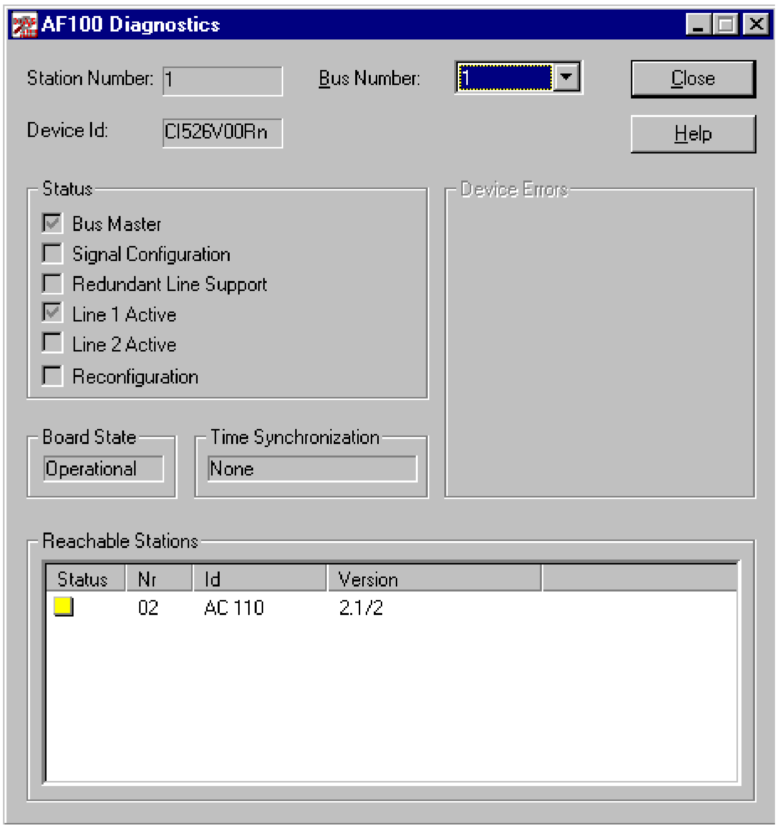
Disconnect target ?

Figure 3-43. Displayed dialog

Testing the communication 1

60. Select **Advant | AF100 Interface | Diagnostics** from the **Start** menu.

A dialog box is displayed, showing the network nodes connected to the AF100 bus and the node status.



Station Number: 1

Bus Number: 1

Device Id: CI526V00Rn

Status

- ☑ Bus Master
- ☐ Signal Configuration
- ☐ Redundant Line Support
- ☑ Line 1 Active
- ☐ Line 2 Active
- ☐ Reconfiguration

Board State: Operational

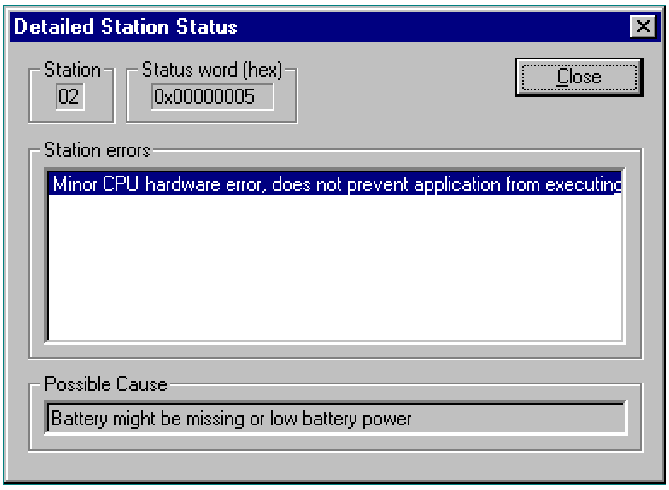
Time Synchronization: None

Reachable Stations

Status	Nr	Id	Version
🟨	02	AC 110	2.1/2

Figure 3-44. AF100 Diagnostics

By double clicking on the status indicator of the newly configured station you can get more detailed information.



Station: 02

Status word (hex): 0x00000005

Station errors: Minor CPU hardware error, does not prevent application from executinc

Possible Cause: Battery might be missing or low battery power

Figure 3-45. Detailed Station Status

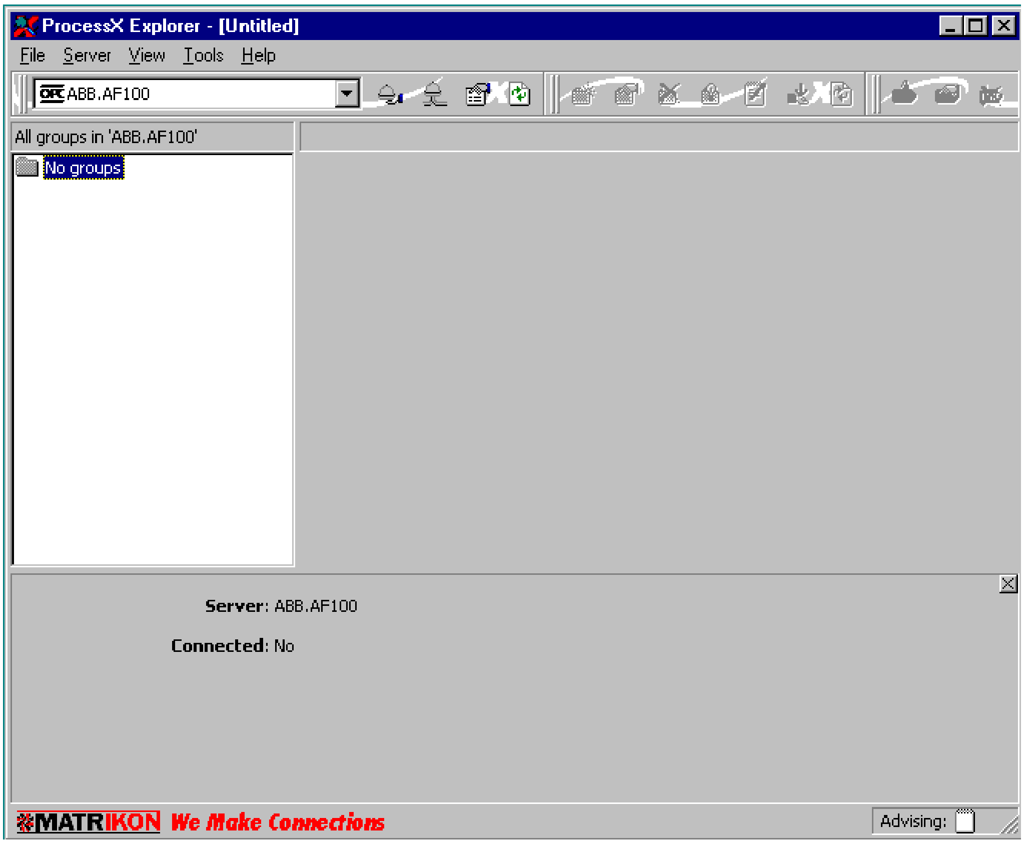
For an explanation of the different dialog texts, see Section 4.2, Operating Instructions.

Testing the communication 2

You can try to access an object using an OPC client.

This example will show how to use the ProcessX Explorer, which is an OPC client from Matrikon Systems. At Matrikon’s web page, *www.matrikon.com*, you will find more information about this application.

61. Start the ProcessX Explorer.


ProcessX Explorer - [Untitled]
File Server View Tools Help
ABB.AF100
All groups in 'ABB.AF100'
No groups
MATRIKON We Make Connections
Advising:

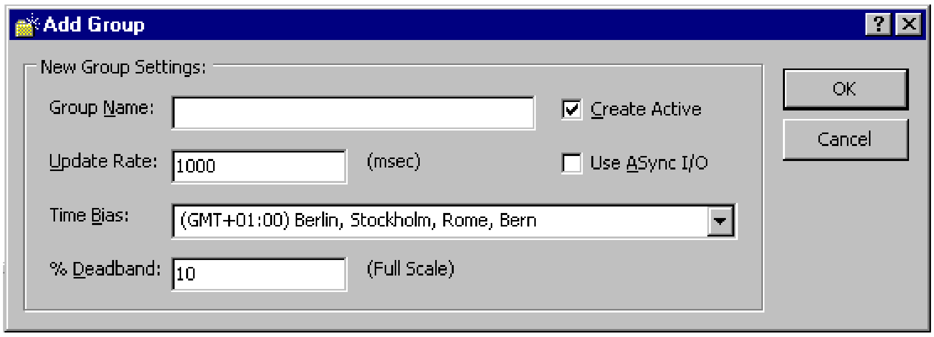
Server: ABB.AF100

Connected: No

Figure 3-46. Start window for ProcessX Explorer, an OPC client

62. Connect to the Advant OPC Server for AF100 by selecting ABB.AF100 from the dropmenu and then select **Connect | Local** from the **Server** menu. Verify that status for Connected changes from No to Yes.

63. Create a group by choosing **Server | Add Group.** A dialog box is displayed where you can fill in the common properties for all items in this group. Enter a name and accept the default values.

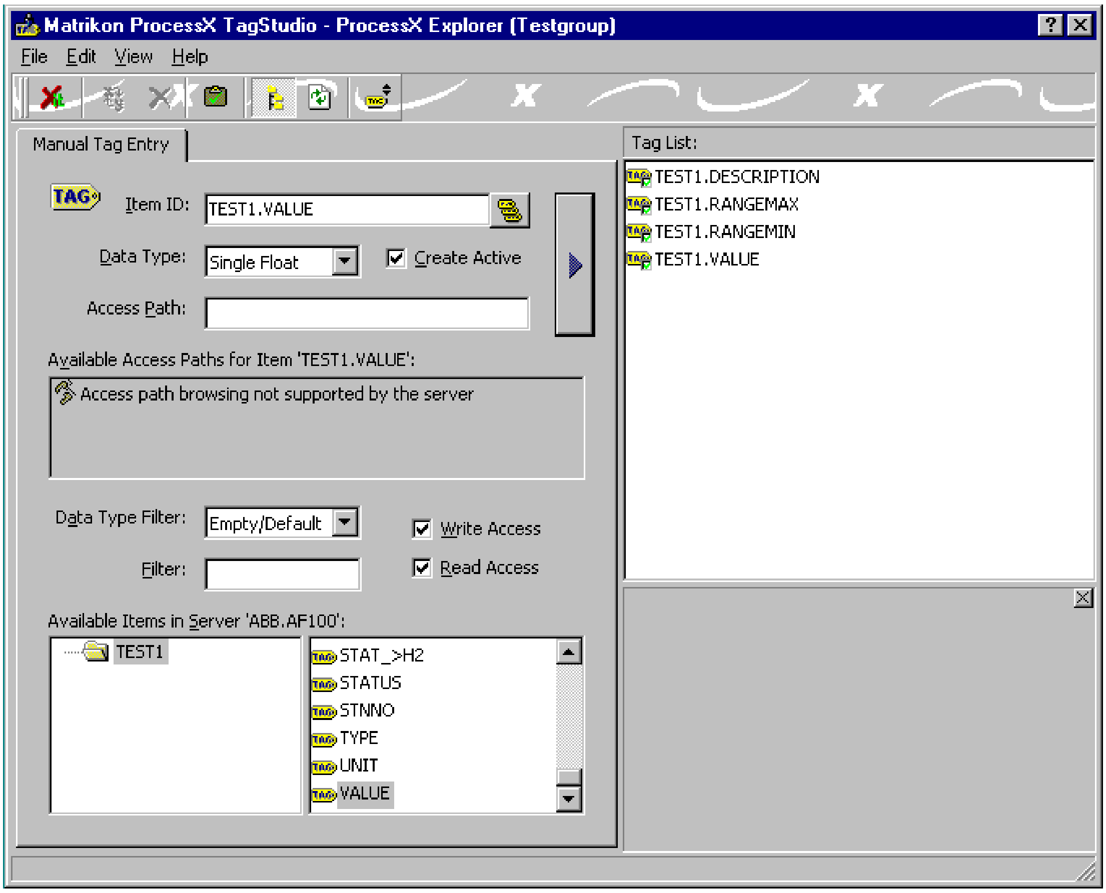


Group Name:
☑ Create Active
Update Rate: 1000 (msec)
☐ Use ASync I/O
Time Bias: (GMT+01:00) Berlin, Stockholm, Rome, Bern
% Deadband: 10 (Full Scale)

Figure 3-47. Dialog box for OPC Group

64. Create items by choosing **Group | Add Items**. A new window called TagStudio is displayed. There are several ways to define the tags you want to use as items.
    - You can write the objectname and attribute in the Item ID input line, following the item syntax described in Section 3.5, Configuration of Advant OPC Server for AF100.
    - At the bottom of the window you can see available objects in the OPC Server. Click on the object and you can see the available attributes. Doubleclick to choose an item.
    - You can use the Tag Generator which is started with the button to the right of the Item ID input line.
65. Write `TEST1.DESCRIPTION` in the Item ID line.
66. Click on the right arrow button to put the item in the tag list.

67. Define some more items if you like.



Item ID: TEST1.VALUE

Data Type: Single Float

☑ Create Active

Access Path:

Available Access Paths for Item 'TEST1.VALUE':

Access path browsing not supported by the server

Data Type Filter: Empty/Default

☑ Write Access

Filter:

☑ Read Access

Available Items in Server 'ABB.AF100':

- TEST1
  - STAT_>H2
  - STATUS
  - STNNO
  - TYPE
  - UNIT
  - VALUE

Tag List:

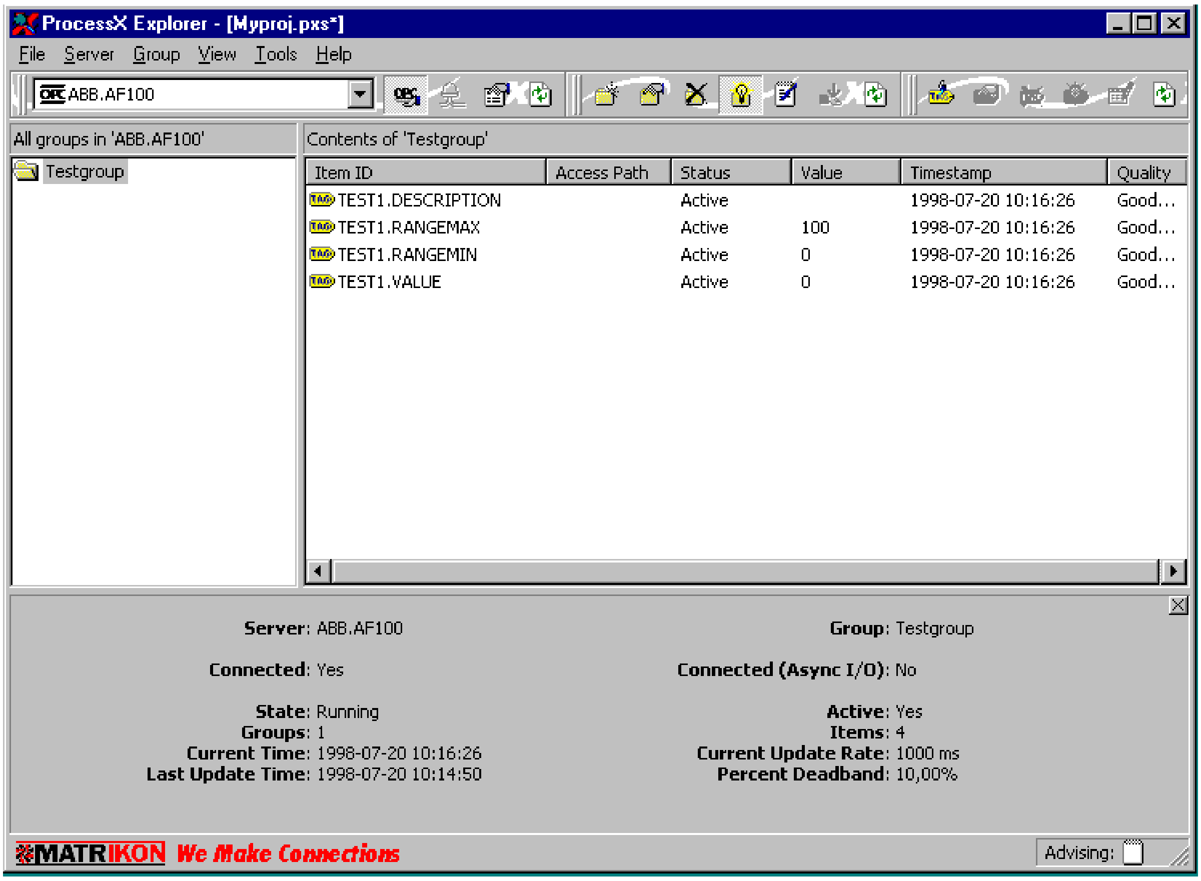
- TEST1.DESCRIPTION
- TEST1.RANGEMAX
- TEST1.RANGEMIN
- TEST1.VALUE

Figure 3-48. ProcessX TagStudio

68. Return to the ProcessX Explorer window by selecting **Update and Return to Explorer** in the **File** menu.

69. Save your configuration by choosing **File | Save As** and enter a file name, (Myproj).

70. The items will now be updated with data from the OPC Server.


ProcessX Explorer - [Myproj.pxs*]
File Server Group View Tools Help
ABB.AF100
All groups in 'ABB.AF100'
Testgroup
Contents of 'Testgroup'
MATRIKON We Make Connections
Advising:

Item ID	Access Path	Status	Value	Timestamp	Quality
TEST1.DESCRIPTION		Active		1998-07-20 10:16:26	Good...
TEST1.RANGEMAX		Active	100	1998-07-20 10:16:26	Good...
TEST1.RANGEMIN		Active	0	1998-07-20 10:16:26	Good...
TEST1.VALUE		Active	0	1998-07-20 10:16:26	Good...

Server: ABB.AF100
Connected: Yes
State: Running
Groups: 1
Current Time: 1998-07-20 10:16:26
Last Update Time: 1998-07-20 10:14:50

Group: Testgroup
Connected (Async I/O): No
Active: Yes
Items: 4
Current Update Rate: 1000 ms
Percent Deadband: 10,00%

Figure 3-49. ProcessX Explorer with active items

3.5.3.2 Creating a Small Test Configuration Using DAT Based Objects

For information about configuration of DAT based objects see the *Function Chart Builder User´s Guide, Bus Configuration Builder User´s Guide and the Release Notes for Advant OPC Server for AF100.*

3.5.3.3 Example Showing the Use of the Automation Interface

Client programs, created using scripting languages, like Visual Basic, will normally use the Automation Interface. Client programs which are created in C++ will find it easiest to use the custom interface for maximum performance.

The following example will show how the Automation Interface facilitates the use of Excel to interface with the Advant OPC Server for AF100.

1. Start the program MicroSoft Excel and select a new workbook.
2. You create a command button by selecting the **Toolbars** - **Control Toolbox** from the **View** menu.
   – You can change the properties of the command button if you click the right hand mouse button or select the **Properties** from the **File** menu.
3. You enter the programming environment by double clicking the command button or if you select the **Macro** - **Visual Basic Editor** from the **Tools** menu. You get the following two lines by default.

```
Private Sub CommandButton!_click()
End Sub
```

NOTE

First of all you need to define the OPC Automation 2.0 reference. You do that by selecting the OPC Automation Interface 2.0 from the listed options in the **Tool** - **Reference Dialog Box**.
The programming example will collect the value of a certain object connected to the Advant OPC Server. The object is assigned with name in cell 6,2 and presented with its current value when clicking the command button.

Option Explicit

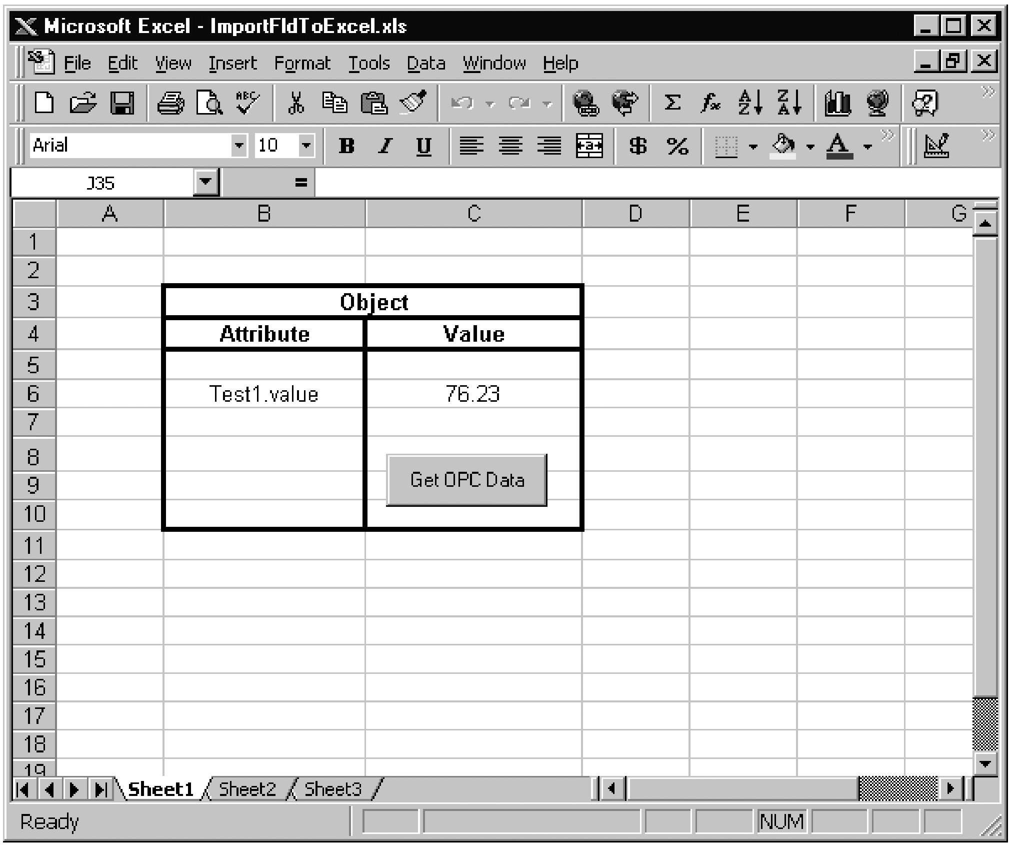
```
Public Server As OPCServer
Public Group As OPCGroup

Private Sub CommandButton1_Click()
Dim names(1) As String
Dim accessPaths(1) As String
Dim ClientHandlers(1) As Long
Dim DataTypes(1) As Integer
Dim ServerHandles() As Long
Dim Errors() As Long
Dim Server As Variant
Dim nodename Text As string
Dim anItem As OPCItem
Dim start As Long

Initialize
accessPaths(1) = ““
ClientHandles(1) = 0
DataTypes(1) = vbEmpty
```

‘User inputs is read from cell 6B and expected to be in the form ObjectInstance. Attribute where ‘ObjectInstance is an instance of a DAT or XDB object.

```
names(1) = Cells(6, 2). Value
```

```
‘Create an instance of the OPC Server object and connect it to the Advant OPC Server for
‘AF100. The created server object instance contains an OPC Groups automation collection.
Set Server = New OPCServer
Server.Connect “ABB.AF100”, NodenameText

‘Add a OPC Group object instance to the groups collection. The created group object instance
‘contains an OPC Items automation collection.
Set Group = Server.OPCGroups.ADD(““)

‘Add the ObjectInstance attribute whose value we wish to acquire as an item instance to the
‘items collection. Retrieve the created object instance using the corresponding (index=1) server
‘item handle returned in the ServerHandles array by the AddItems method
Group.OPCItems.AddItems 1, names, ClientHandles, ServerHandles,
Errors, DataTypes, accessPaths Set anItem =
Group.OPCItems.GetOPCItem(ServerHandlers(1))

‘Read the item data from cache and place it in cell 6C. Wait a second to make sure that the cache
‘has been updated.
start = Timer
Do While Timer < start + 1
Loop

AnItem.Read OPC Cache
Cells(6 , 3).Value = anItem.Vale
```

```
        End Sub
```


Microsoft Excel - ImportFldToExcel.xls
File Edit View Insert Format Tools Data Window Help
Arial
10
J35
=
A
B
C
D
E
F
G
Get OPC Data
Sheet1
Sheet2
Sheet3
Ready
NUM

Object	
Attribute	**Value**
Test1.value	76.23

Figure 3-50. Visual Basic Program

Chapter 4 Runtime Operation

4.1 Operating Overview

This section briefly describes how the Advant OPC Server for AF100 operates during start-up, runtime and shutdown.

CI board Start-up

When you start the Advant OPC Server for AF100 (the communication part):

- The CI board initiates and the CI-profile, containing station number, bus number, etc., is downloaded from the registry in Windows NT.
- All DSPs from the Bus Configuration Database are loaded (this step is omitted if the CI board is already operational when the software is started and/or if no new DSP configuration is to be loaded).
- All the EVSs from the Bus Configuration Database are loaded.
- The CI board goes operational and data exchange with DataSet Peripherals starts.

Runtime

During runtime, the DATs on the CI board are cyclically updated via DataSet Peripheral (DSP) from the other stations on the AF100 network. The cycle time for the DSP communication is defined in the FCB.

Cyclic subscriptions of DAT values are defined by the client application and handled by the Advant OPC Server for AF100. They have no connection to the DSP cycle time.

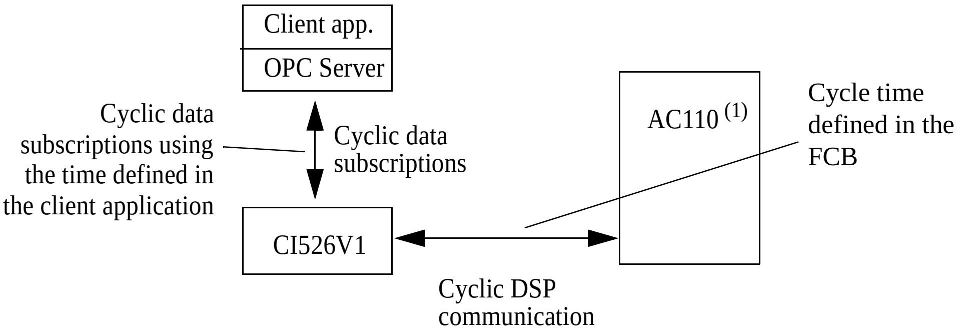

Client app.
OPC Server
Cyclic data subscriptions using the time defined in the client application
Cyclic data subscriptions
AC110 (1)
Cycle time defined in the FCB
CI526V1
Cyclic DSP communication

Figure 4-1. Cyclic data traffic for the AF100 Interface

(1) The cycle time of the PCPGM, Control module and SCANT should be considered internally in the controller.

Shutdown

When you close the Advant OPC Server for AF100, the CI board goes to a passive state and the DataSet Peripheral transfer stops.

The CI board also goes to a passive state if the Advant OPC Server for AF100 lifesign stops as described below.

Mutual lifesign supervision

The Advant OPC Server for AF100 and the CI board provide each other with a lifesign. This mutual lifesign supervision is automatically enabled at start up of the Advant OPC Server for AF100.

The Advant OPC Server for AF100 lifesign ensures that the CI board goes to a passive state in case of a program crash.

The CI board lifesign automatically detects if there is a problem on the board. If for example the AF100 bus cable is disconnected the CI board will be automatically restarted when the cable is connected again.

4.2 Operating Instructions

4.2.1 How to View System Status

To view the internal status and diagnostics of the AF100 Interface, select
Advant | AF100 Interface | Diagnostics from the **Start** menu.

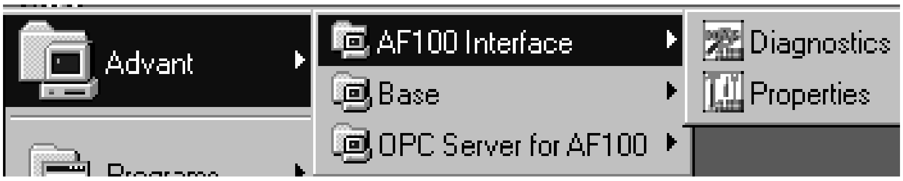
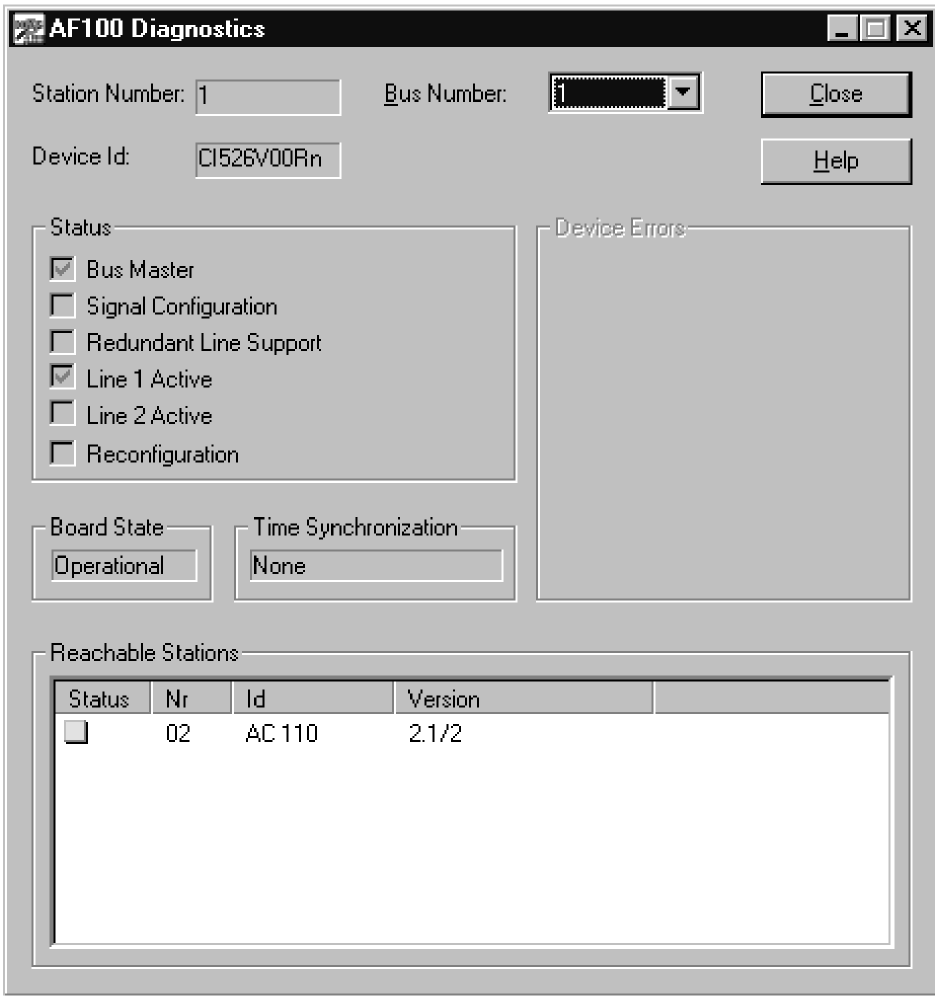


Figure 4-2. Advant Fieldbus 100 Interface start menu

AF100 Diagnostics



Station Number: 1

Bus Number: 1

Device Id: CI526V00Rn

Status

☑ Bus Master
☐ Signal Configuration
☐ Redundant Line Support
☑ Line 1 Active
☐ Line 2 Active
☐ Reconfiguration

Board State: Operational

Time Synchronization: None

Reachable Stations

Status	Nr	Id	Version
☐	02	AC 110	2.1/2

Figure 4-3. Diagnostics

- **Station Number**

  Station number for the current station. Must be a number 1-80 that is unique on the bus.

- **Bus Number**

  0 - 255. Available busses for the station.

- **Device Id**

  The Device Id shows the type, version and revision of the interface board.

- **Bus Master**

  Bus Master configuration ON or OFF - should always be ON.

- **Signal Configuration**

  The Signal Configuration shows that configuration data is being transferred to the CI526V1 board and normal runtime operation is disabled.

- **Redundant Line Support**

  The Redundant Line Support is checked if redundant modems are used.

- **Line 1 Active**

  If Line1 Active is checked, the line 1 is chosen from the two redundant lines.

- **Line 2 Active**

  If Line 2 Active is checked, line 2 is used.

- **Reconfiguration**

  The reconfiguration shows when errors or discrepancies are detected when the CI is scanning bus administration lists from other bus masters.

- **Board State**

  The Board State indicates the current mode of the CI526V1 board.

  - Operational - the communication board is running
  - Ready - the board is configured but not operational
  - Not Ready - the board is not operational and the configuration has been cleared
  - Error - the board is passive and not operating properly.

- **Time Synchronization**

  Possible modes are None, Slave, Master or Backup.

- **Device Errors**

  Errors from the CI board are displayed in the Device Error window.
  Double click on a device error to get more information about the error.

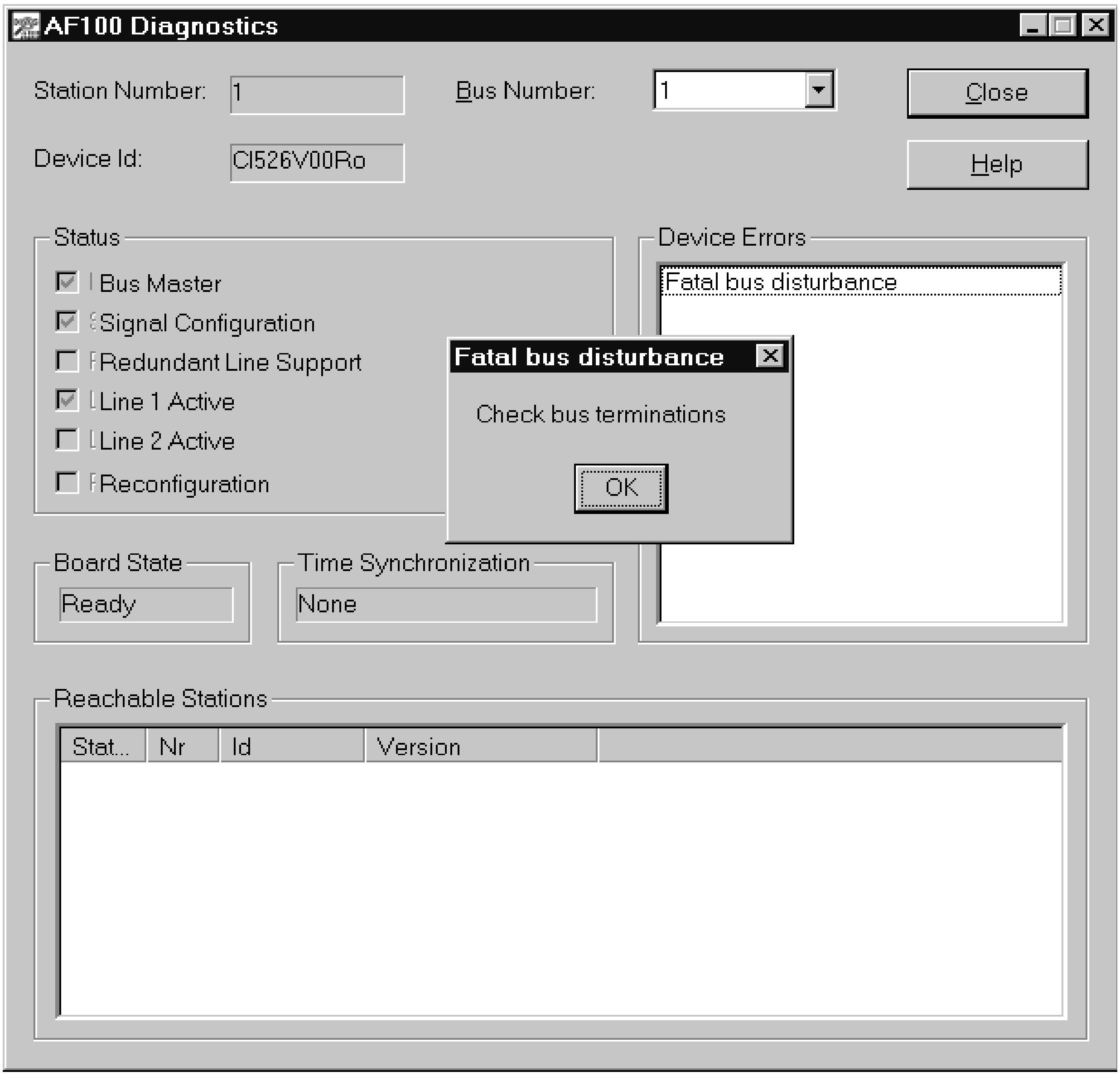
- **Reachable Stations**

  All reachable stations are displayed in the Reachable Stations window.
  By double clicking one of the reachable stations, detailed station status can be viewed, with information of errors and possible cause.

  The status is marked with green, yellow and red meaning:

  - green - station operational and no errors.
  - yellow - minor station error, which does not prevent the application from running.
  - red - station not operational due to fatal error or blocked.

Device Errors



Station Number: 1

Bus Number: 1

Device Id: CI526V00Ro

Status:
- ☑ Bus Master
- ☑ Signal Configuration
- ☐ Redundant Line Support
- ☑ Line 1 Active
- ☐ Line 2 Active
- ☐ Reconfiguration

Board State: Ready

Time Synchronization: None

Device Errors: Fatal bus disturbance

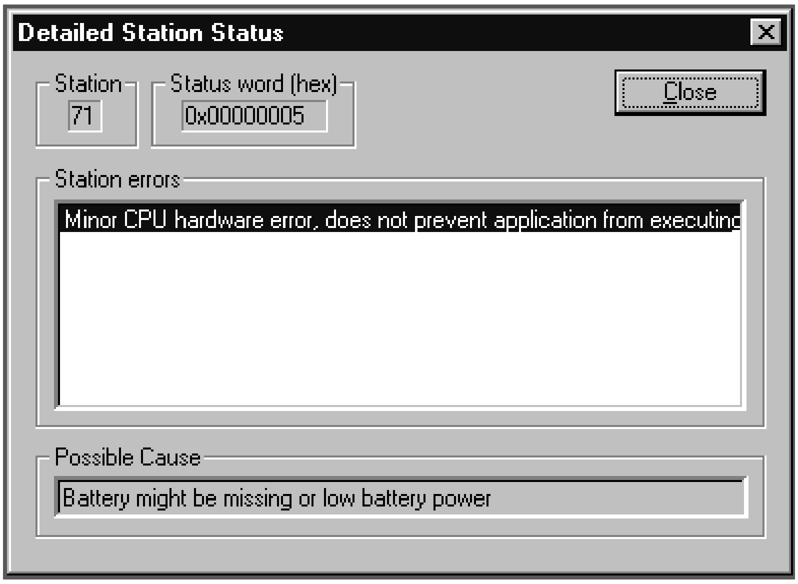
Fatal bus disturbance

Check bus terminations

Figure 4-4. Information about one of the device errors

Double click on an device error to get more information about the error.

Detailed Station Status



Station: 71

Status word (hex): 0x00000005

Station errors: Minor CPU hardware error, does not prevent application from executing

Possible Cause: Battery might be missing or low battery power

Figure 4-5. Detailed Station Status

Double click on one of the reachable stations, to view more detailed station status, with information of errors and possible cause.

4.2.2 How to View System Messages

Select **Advant | Base | System Messages** to start the System Message Viewer.

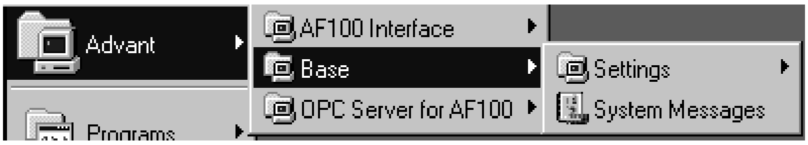
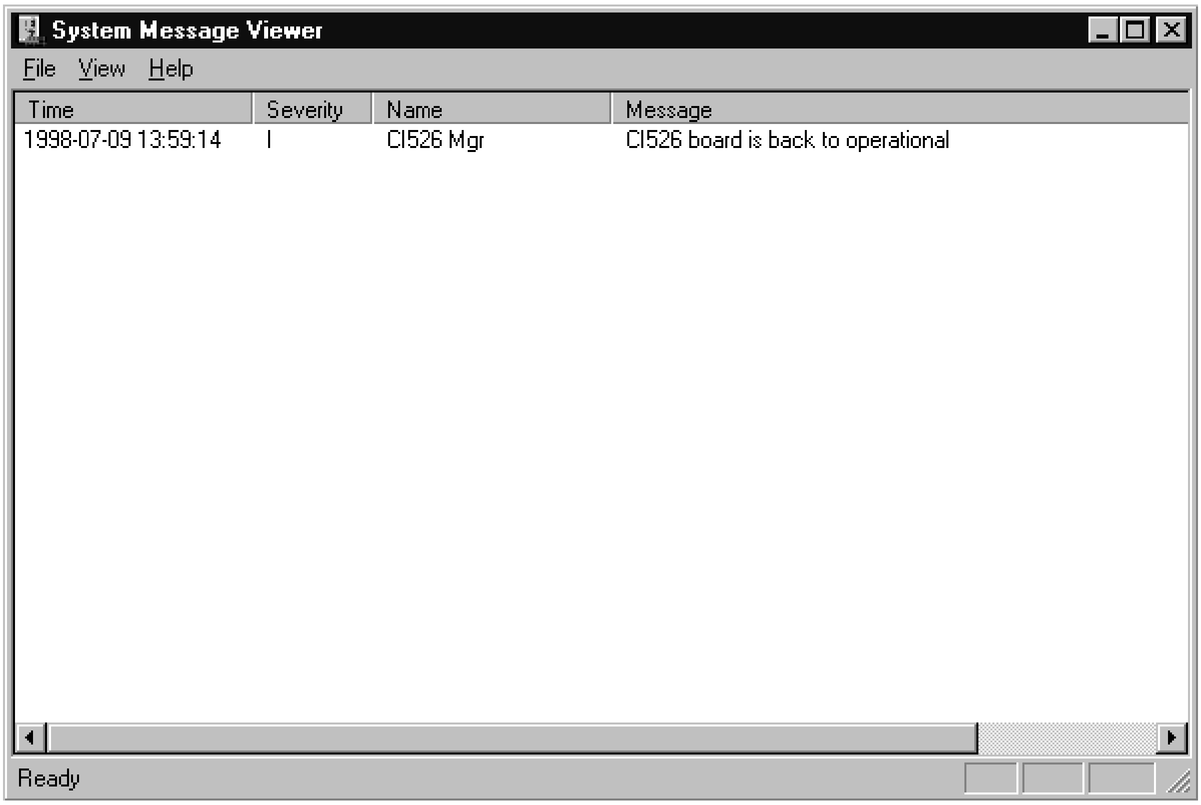


Figure 4-6. How to start System Message Viewer

This window displays messages from your installed Advant Fieldbus 100 Interface Software.



Time	Severity	Name	Message
1998-07-09 13:59:14	I	CI526 Mgr	CI526 board is back to operational

Figure 4-7. System Messages window

The System Messages window has features to selectively display messages, display detailed information about messages and print out messages.

The fields on the display are described below

- **Time**

  The time when the message occurred. You can select one or many messages via keys or mouse. The selected messages can then be detailed examined or printed, either via the menu bar or a popup.

- **Severity**
  - **I**(nformation) means informational messages to the system user.
    Normally no action is required.
  - **W**(arning) means that an event has occurred that *might* have to be investigated.

  - **E**(rror) means an error has occurred that impairs a function but does not stop the process.
  - **F**(atal) means an error has occurred that has stopped a vital process. This means that the function concerned can not be used without your system manager investigating the matter and restarting the process involved.
- **Name**

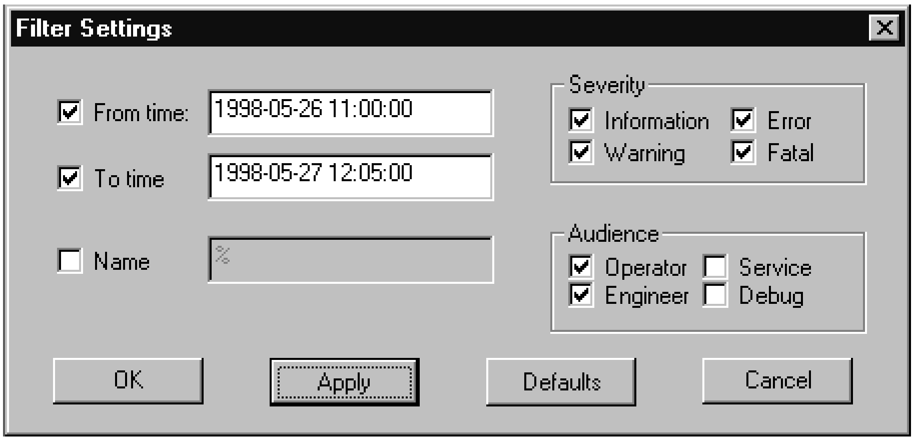
  The name of the program or object that sent the message.
- **Message**

  The message text.

Menu Bar Items

- **File - Exit**- Exits the System Messages window.
- **Print** - Prints the displayed messages.
- **View**
  - **Filter**
    Displays the filter dialog, see below.
  - **Details**
    Views detailed information about selected messages, see below.
  - **Auto refresh**
    Toggles automatic refresh of the display.
  - **Refresh**
    Refreshes the display to get new messages
- **Help**
  - **Contents**
    Runs help and displays the contents
  - **Search for help on**
    Displays Help's Search dialog box so you can quickly find the information you need.
  - **About**
    Displays a dialog box with the version number and a copyright notice

When you first activate the display all messages available are displayed.
Use the filter settings dialog box, to select a subset of the messages.



Filter Settings

☑ From time: 1998-05-26 11:00:00

☑ To time 1998-05-27 12:05:00

☐ Name %

Severity: ☑ Information ☑ Error ☑ Warning ☑ Fatal

Audience: ☑ Operator ☐ Service ☑ Engineer ☐ Debug

Figure 4-8. Filter Settings

- **From Time / To Time**

  From Time and To Time fields define the time span within which system messages are to be displayed. The full format (both date and time) for From and To Time is dependent of the regional settings in Windows.

- **Severity**

  Used to select system messages of a certain severity level. To select the messages of a specific severity level, select Information, Warning, Error or Fatal from the Severity options. Note that you can select more than one level.

- **Audience**

  Specifies the audience the system messages are directed to.The following values can be used, Operator, Engineer, Service and Debug. Note that more than one type of audience can be selected.

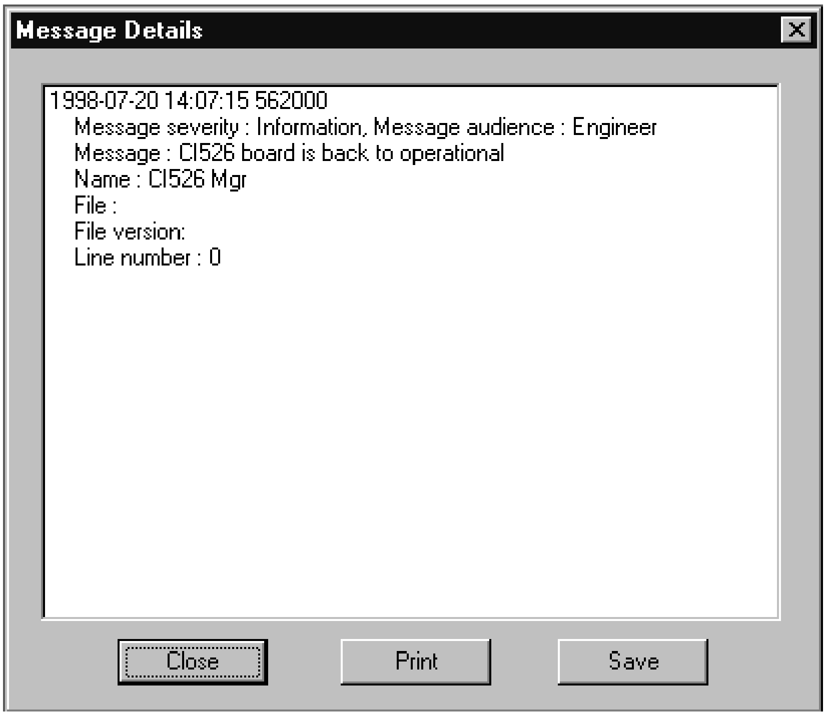
  – **Operator** messages are intended for process operators.

  – **Engineer** messages are intended for process engineers.

  – **Service** messages are intended for ABB service personnel.

  – **Debug** is not used for the Advant OPC Server for AF100.

Message Details



```
1998-07-20 14:07:15 562000
    Message severity : Information, Message audience : Engineer
    Message : CI526 board is back to operational
    Name : CI526 Mgr
    File :
    File version:
    Line number : 0
```

Figure 4-9. Message Details information box

Double click one of the errors in the System Messages Viewer, to get more details about the message

Chapter 5 Maintenance

5.1 Preventive Maintenance

Follow ESD precautions to avoid component damage when you handle the CI board. For example, place the board on anti-static material and take grounding precautions.

We recommend that you follow a backup routine to secure configuration data regularly and whenever you reconfigure the system or change object definitions.

Use Windows NT normal backup routines to backup application data produced by AMPL Control Configuration.

For a general description of maintenance of the Advant Fieldbus 100 network, see the *Advant Fieldbus 100 User's Guide*.

5.2 Hardware Indicators

LED indicators on the modem indicate the following:

- The green **P** LED is the power indicator.
- The yellow **RX** LED is the bus receive indicator. It should be lighted when the modem is connected to the AF100 network cable.
- The yellow **TX** LED is the bus transmit indicator. It should start to blink when the CI board is up and running.

5.3 Error Messages

Error messages from the Advant OPC Server for AF100 are reported in two ways.

Software Errors:

All software errors are reported to the System Messages Viewer.

Hardware Errors:

Error information from the CI board is listed in the AF100 Interface Diagnostics window.

The Errors information from the CI board helps determine the source of errors.

- The **Permanent sender** identification shows the address of the permanent sender on the bus.
- The **Multiple source** item identifies the address of the station where two stations answer.
- The **Invalid telegram** item identifies the address of the station attempting to send non-identifiable information.
- The **Invalid telegram data** item shows the data content of the invalid telegram identified above.

5.4 Fault Finding and User Repair

If your system is installed and started but not properly running, follow the steps listed below to determine the cause and the actions to take:

1. View the **System Messages Viewer** application to determine the source of the problem.

   If the Advant OPC Server for AF100 software is the source, go on to the next step. If the problem originates from one of the other software units in your system, consult the corresponding user's guide.

2. Start the **AF100 Diagnostics** application and check for critical status flags and error messages.

   If the board state is not **operational**, try to force the CI board to operational as described in Section 3.4.1, Properties.

3. Check the status of the ABB Services and CI Device driver. Check also if the Windows NT Event Viewer reports any problems. This is described in Chapter 5.4.1, Check ABB Service, CI Device Driver and Event Viewer.
4. If the Advant OPC Server is not responding, restart the PC. If this has no effect, power off and power on your PC, simultaneously resetting the CI board.
5. If the above actions are not successful, contact your local ABB support representative.

If the System Messages database has been deleted or is corrupt, it can be recreated by the following command, in a command prompt window:

```
c:\program files\abb\advant\SystemModules\
BasicServices\1.0\bin\
```

```
bsSysLogConfig I
```

5.4.1 Check ABB Service, CI Device Driver and Event Viewer

Make sure that the four ABB Services are indicated started in the Windows NT Service application. You start the Services application by selecting:

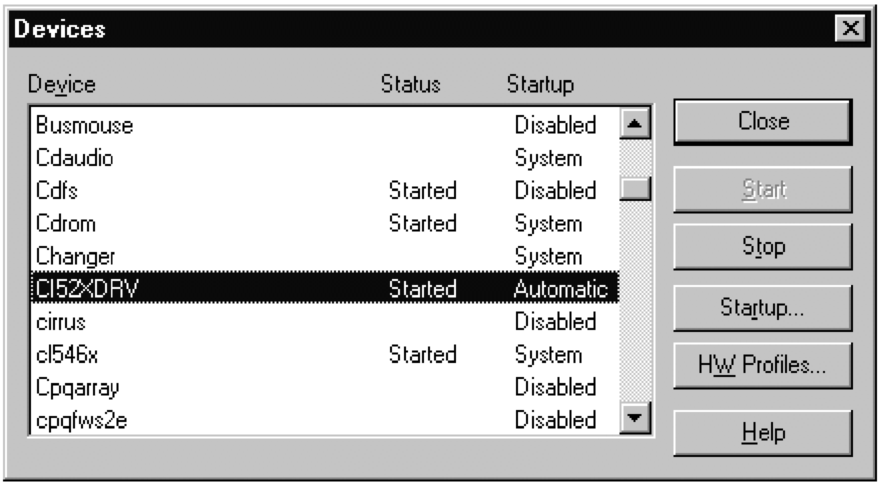
Start | Settings | ControlPanel | Services

The following services must be started:

- ABB Advant Fieldbus 100 OPC Server
- ABB Advant System Messages Log
- ABB Advant VFI Server
- ABB Advant CI526 Manager

Make sure that the CI Device driver is indicated started in the Windows NT Devices by selecting:

Start | Settings | ControlPanel | Devices

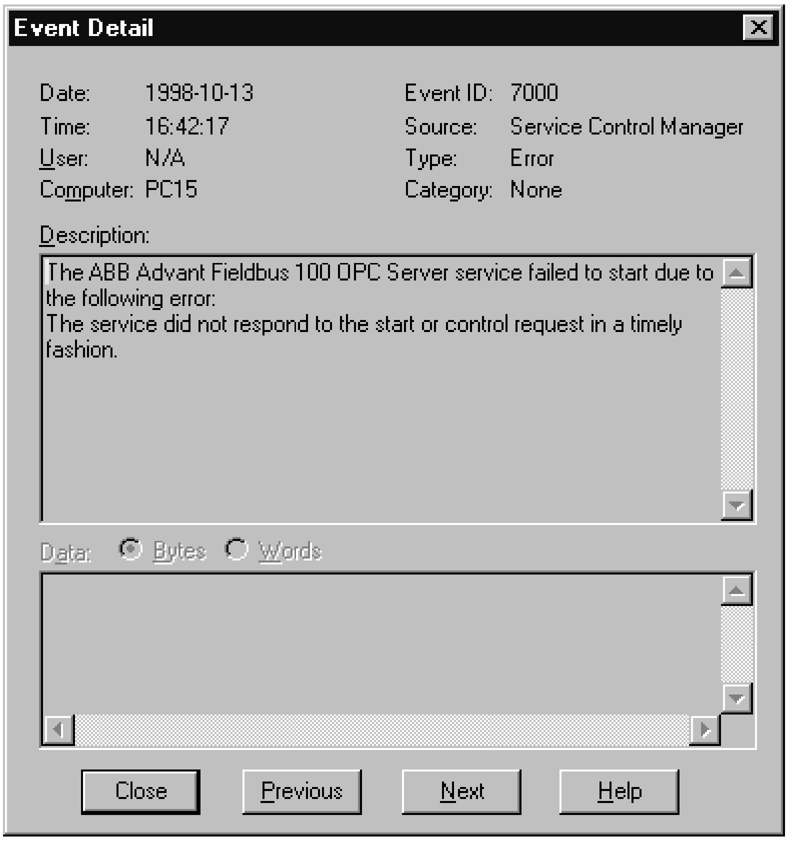


Device	Status	Startup
Busmouse		Disabled
Cdaudio		System
Cdfs	Started	Disabled
Cdrom	Started	System
Changer		System
CI52XDRV	Started	Automatic
cirrus		Disabled
cl546x	Started	System
Cpqarray		Disabled
cpqfws2e		Disabled

Figure 5-1. Windows NT Devices

If the Advant OPC Server for AF100 Service or Devices does not start, the reason for this can be found in the Windows NT Event Viewer. You start the Windows NT Event Viewer by selecting:

Start | Programs | Administrative Tools | Event Viewer



Date: 1998-10-13
Time: 16:42:17
User: N/A
Computer: PC15
Event ID: 7000
Source: Service Control Manager
Type: Error
Category: None

Description:
The ABB Advant Fieldbus 100 OPC Server service failed to start due to the following error:
The service did not respond to the start or control request in a timely fashion.

Figure 5-2. Event Detail

In this example the problem occurred when the Advant OPC Server for Advant Fieldbus 100 software where installed on an older version without rebooting the personal computer (PC) after the installation.

The problem was solved by rebooting the personal computer (PC).

Appendix A Object Attributes, Commands and Events

A.1 General

The tables below include object attributes that can be accessed by the client application, commands that are supported and available events for each object type.

A.1.1 Alarms and Events

When the AF100 OPC Server reports an event back to an OPC client, each event will be marked with a OPC quality.

This quality can be one of the four below:

OPC_QUALITY_GOOD;	OK.
OPC_QUALITY_BAD;	Queue overflow
OPC_QUALITY_SENSOR_FAILURE;	Hardware error
OPC_QUALITY_UNCERTAIN;	Uncertain time from controller or timestamp

locally created in the PC System Messages will inform if the time stamp is locally created. Note that all DAT-based acknowledgements are locally timestamped in the PC.

A.2 Analog Input Object Type (AIS and DAT_AI)

A.2.1 Attributes

The table below shows all available attributes for an analog input object.

Table A-1. Analog Input object type attributes

Attribute	Description	Native Object Type	Permissions	Not available for DAT based objects
NAME	The name of the object	STRING	Read	
DESCRIPTION	The description of the object	STRING	Read	
VALUE	The current value of the object(1)	REAL	Read/Write	
NO_OF_DEC	Number of decimals	INTEGER	Read	x
UNIT	The unit of the object	STRING	Read	
SUBSYSTEM	Process section 0-16	INTEGER	Read	

Table A-1. Analog Input object type attributes (Continued)

Attribute	Description	Native Object Type	Permissions	Not available for DAT based objects
CLASS	Class	INTEGER	Read	x
RANGE_MIN	The smallest allowed object value	REAL	Read	
RANGE_MAX	The highest allowed object value	REAL	Read	
MAX_LIM	Maximum value displayed on screen	REAL	Read	x
MIN_LIM	Minium value displayed on screen	REAL	Read	x
START_VALUE	Initial value at controller startup	REAL	Read	x
HI_LIM2	Alarm limit value HI_LIM2	REAL	Read/Write	x (2)
HI_LIM1	Alarm limit value HI_LIM1	REAL	Read/Write	x (2)
LO_LIM1	Alarm limit value LO_LIM1	REAL	Read/Write	x (2)
LO_LIM2	Alarm limit value LO_LIM2	REAL	Read/Write	x (2)
USE_HI_LIM2	Alarm limit value HI_LIM2 used	BOOLEAN	Read	x
USE_HI_LIM1	Alarm limit value HI_LIM1 used	BOOLEAN	Read	x
USE_LO_LIM1	Alarm limit value LO_LIM1 used	BOOLEAN	Read	x
USE_LO_LIM2	Alarm limit value LO_LIM2 used	BOOLEAN	Read	x
LIM1_TREAT	Value of event treatment definition	INTEGER	Read	x
LIM2_TREAT	Value of event treatment definition	INTEGER	Read	x
ERROR_TREAT	Value of event treatment definition	INTEGER	Read	x

Table A-1. Analog Input object type attributes (Continued)

Attribute	**Description**	**Native Object Type**	**Permissions**	**Not available for DAT based objects**
HWVALMAX	Highest value the controller hardware can process	REAL	Read	x
HWVALMIN	Lowest value the controller hardware can process	REAL	Read	x
STATUS	Presents the status of the object	INTEGER LONG	Read	(3)
T0VAL_H1	String to use when high limit 1 is no longer transgressed.	STRING	Read	x
T0VAL_H2	String to use when high limit 2 is no longer transgressed.	STRING	Read	x
T0VAL_L1	String to use when low limit 1 is no longer transgressed.	STRING	Read	x
T0VAL_L2	String to use when low limit 2 is no longer transgressed.	STRING	Read	x
T1VAL_H1	String to use for high limit 1 transgression.	STRING	Read	x
T1VAL_H2	String to use for high limit 2 transgression.	STRING	Read	x
T1VAL_L1	String to use for low limit 1 transgression.	STRING	Read	x
T1VAL_L2	String to use for low limit 2 transgression.	STRING	Read	x
TYPE	Object type	STRING	Read	
NETW	Equal to the bus number	INTEGER	Read	
NODE	Equal to the station number	INTEGER	Read	
CPU	CPU position	INTEGER	Read	

(1) **Scaling of VALUE attribute**
The full range defined by the engineering unit is scaled to the I/O board value range.

$$VALUE = \left(\frac{RANGEMAX - RANGEMIN}{HWVALMAX - HWVALMIN} \times (InputValue - HWVALMIN)\right) + RANGEMIN$$

This yields
- VALUE = RANGEMIN if Input value = HWVALMIN
- VALUE = RANGEMAX if Input value = HWVALMAX

The scaling is reciprocal when *writing* to the VALUE attribute.

Before writing the value (via SDP or DSP) it is checked against the RANGEMIN/RANGEMAX attributes.

(2) The limit value change generates an event which distributes the new value to all active OPC Servers. The AIS must be linked to an EVS for this to work. Note that if an OPC Server is restarted after the event has occured it will retrieve the basic limit settings from the BCD.

(3) Possible to subscribe on within the same OPC Server.

The table below shows all available status bits for an analog input object.

Table A-2. Analog Input object type status bits

Bit in STATUS	Bit no	Description	Permissions	Not available for DAT based objects
ACTIVE	1	Object active, i.e. ready to run	Read	(1)
ERROR	2	Indicates the overview status	Read	(1)
UPDATED	3	Indicates if the object value is updated	Read	(1)
UPD_BLK	4	The value is blocked or forced by AdvaBuild	Read/Write	x
SELECTED	6	Select the object. Only within the same Advant OPC Server for AF100.	Read/Write	(1)
ABOVE_HI_LIM2	9	Alarm limit transgressed	Read	x

Table A-2. Analog Input object type status bits (Continued)

Bit in STATUS	**Bit no**	**Description**	**Permissions**	**Not available for DAT based objects**
ABOVE_HI_LIM1	10	Alarm limit transgressed	Read	x
BELOW_LO_LIM1	11	Alarm limit transgressed	Read	x
BELOW_LO_LIM2	12	Alarm limit transgressed	Read	x
ALARM_UNACK	13	Alarm unacknowledged	Read/Write	x
DISTURBANCE	15	The object is in an error state	Read	x
ALARM_BLK	17	Alarms are blocked	Read/Write	x
ALARM_PERIOD_BLK	18	Value of event set status (EVS_STAT): 0: mode changes do not generate events 1: mode changes do generate events	Read	x
PRINT_BLK	19	Block alarm printouts. Only within the same Advant OPC Server for AF100.	Read/Write	x
ERR_CTRL	32	Value of event set status (EVS_ERR): 0: HW errors do not generate events 1: HW errors do generate events	Read	x

(1) Possible to subscribe on within the same OPC Server

A.2.2 Events

The table shows all available events for an analog input object.

Table A-3. Events for the Analog Input object type

AF100 Event	**Description**	**OPC Event Type**	**OPC Event Category**	**Not available for DAT based objects**
HW Error	Hardware error	Condition	Hardware Error	x
Alarm Unack	Alarm acknowledged	Condition	-	
HiLim2 Trans	High Limit 2 transgression	Condition	Level	
HiLim1 Trans	High Limit 1 transgression	Condition	Level	
LoLim1 Tans	Low Limit 1 transgression	Condition	Level	
LoLim2 Trans	Low Limit 2 transgression	Condition	Level	
HiLim2 Mod	High Limit 2 value changed	Simple	System Message	x
HiLim1 Mod	High Limit 1 value changed	Simple	System Message	x
LoLim1 Mod	Low Limit 1 value changed	Simple	System Message	x
LoLim2 Mod	Low Limit 2 value changed	Simple	System Message	x
Update Block	Disable/enable process updates	Simple	System Message	x
Alarm Block	Block/deblock of alarm handling	Simple	System Message	x
Lost Event	Lost event in controller	Simple	System Message	

A.3 Analog Output Object Type (AOS and DAT_AO)

A.3.1 Attributes

The table below shows all available attributes for an analog output object.

Table A-4. Analog Output object type attributes

Attribute	**Description**	**Native Object Type**	**Permissions**	**Not available for DAT based objects**
NAME	The name of the object	STRING	Read	
DESCRIPTION	The description of the object	STRING	Read	
VALUE	The current value of the object(1)	REAL	Read/Write	
NO_OF_DEC	Number of decimals	INTEGER	Read	x
UNIT	The unit of the object	STRING	Read	
SUBSYSTEM	Process section 0-16	INTEGER	Read	
CLASS	Class	INTEGER	Read	x
RANGE_MIN	The smallest allowed object value	REAL	Read	
RANGE_MAX	The highest allowed object value	REAL	Read	
MAX_LIM	The highest allowed value given as a command	REAL	Read	x
MIN_LIM	The lowest allowed value given as a command	REAL	Read	x
ERROR_TREAT	Value of event treatment definition	INTEGER	Read	x
HWVALMAX	Highest value the controller hardware can process	REAL	Read	x
HWVALMIN	Lowest value the controller hardware can process	REAL	Read	x

Table A-4. Analog Output object type attributes (Continued)

Attribute	**Description**	**Native Object Type**	**Permissions**	**Not available for DAT based objects**
HI_LIM	Alarm limit value HI_LIM	REAL	Read	x
LO_LIM	Alarm limi value LO_LIM	REAL	Read	x
INITENHI	Initial value for EN_HI 0 = disable 1 = enable	BOOLEAN	Read	x
INITENLO	Initial value for EN_LO 0 = disable 1 = enable	BOOLEAN	Read	x
START_VALUE	Inital value at controller startup	REAL	Read	x
STATUS	Presents the status of the object	INTEGER LONG	Read	(2)
TYPE	Object type	STRING	Read	
NETW	Equal to the bus number	INTEGER	Read	
NODE	Equal to the station number	INTEGER	Read	
CPU	CPU position	INTEGER	Read	

(1) **Scaling of VALUE attribute**
The full range defined by the engineering unit is scaled to the I/O board value range.

$$VALUE = \left(\frac{RANGEMAX - RANGEMIN}{HWVALMAX - HWVALMIN} \times (OutputValue - HWVALMIN)\right) + RANGEMIN$$

This yields
- VALUE = RANGEMIN if Output value = HWVALMIN
- VALUE = RANGEMAX if Output value = HWVALMAX

The scaling is reciprocal when *writing* to the VALUE attribute.

Before writing the value (via SDP or DSP) it is checked against the RANGEMIN/RANGEMAX attributes.

(2) Possible to subscribe on within the same OPC Server.

The table below shows all available status bits for an analog output object.

Table A-5. Analog Output object type status bits

Bit in STATUS	Bit no	Description	Permissions	Not available for DAT based objects
ACTIVE	1	Object active, i.e. ready to run	Read	(1)
ERROR	2	Indicates the overview status	Read	(1)
UPDATED	3	Indicates if the object value is updated	Read	(1)
OUTP_BLK	4	Output to output connection is blocked. Only within the same Advant OPC Server for AF100.	Read/Write	x
SELECTED	6	Select the object. Only within the same Advant OPC Server for AF100	Read/Write	(1)
MAN_MODE	8	Object is in manual mode	Read/Write	x
ON_MAX_LIM	9	Signals that output value is above high limit	Read	x
ABOVE_HI_LIM1	10	Alarm limit transgressed	Read	x
BELOW_LO_LIM1	11	Alarm limit transgressed	Read	x
ON_MIN_LIM	12	Signals that output value is below low limit	Read	x
ALARM_UNACK	13	Alarm unacknowledged	Read/Write	x
DISTURBANCE	15	The object is in an error state	Read	x
ALARM_BLK	17	Alarms are blocked	Read/Write	x

Table A-5. Analog Output object type status bits

Bit in STATUS	Bit no	Description	Permissions	Not available for DAT based objects
ALARM_PERIOD_BLK	18	Value of event set status (EVS_STAT): 0: mode changes do not generate events 1: mode changes do generate events	Read	x
PRINT_BLK	19	Block alarm printouts. Only within the same Advant OPC Server for AF100.	Read/Write	x
ERR_CTRL	32	Value of event set status (EVS_ERR): 0: HW errors do not generate events 1: HW errors do generate events	Read	x

(1) Possible to subscribe on within the same OPC Server.

A.3.2 Events

The table shows all available events for an analog output object.

Table A-6. Events for the Analog Output object type

AF100 Event	Description	OPC Event Type	OPC Event Category	Not available for DAT based objects
HW Error	Hardware error	Condition	Hardware Error	x
Alarm Unack	Alarm acknowledged	Condition	-	x
HiLim Trans	High Limit transgression	Condition	Level	x
LoLim Tans	Low Limit transgression	Condition	Level	x
Man Auto	Manual/auto mode changes.	Simple	System Message	x

Table A-6. Events for the Analog Output object type

AF100 Event	Description	OPC Event Type	OPC Event Category	Not available for DAT based objects
Alarm Block	Block/deblock of alarm handling	Simple	System Message	x
Lost Event	Lost event in controller	Simple	System Message	x

A.4 Digital Input Object Type (DIS and DAT_DI)

A.4.1 Attributes

The table below shows all available attributes for a digital input object.

Table A-7. Digital Input object type attributes

Attribute	Description	Native Object Type	Permissions	Not available for DAT based objects
NAME	The name of the object	STRING	Read	
DESCRIPTION	The description of the object	STRING	Read	
ERROR_TREAT	Value of event treatment definition	INTEGER	Read	x
VALUE_TREAT	Value of event treatment definition	INTEGER LONG	Read	(1)
NORM_POS	Normal position	BOOLEAN	Read	(1)
VALUE	The current value of the object	INTEGER	Read/Write	
SUBSYSTEM	Process section 0-16	INTEGER	Read	
CLASS	Class	INTEGER	Read	x
TYPE	Object type	STRING	Read	
STATUS	Presents the status of the object	INTEGER	Read	(1)

Table A-7. Digital Input object type attributes (Continued)

Attribute	**Description**	**Native Object Type**	**Permissions**	**Not available for DAT based objects**
T0VAL	String to display for value zero	STRING	Read	x
T1VAL	String to display for value one	STRING	Read	x
NETW	Equal to the bus number	INTEGER	Read	
NODE	Equal to the station number	INTEGER	Read	
CPU	CPU position	INTEGER	Read	

(1) Possible to subscribe on within the same OPC Server.

The table below shows all available status bits for a digital input object.

Table A-8. Digital Input object type status bits

Bit in STATUS	**Bit no**	**Description**	**Permissions**	**Not available for DAT based objects**
ACTIVE	1	Object active, i.e. ready to run	Read	(1)
ERROR	2	Indicates the overview status	Read	(1)
UPDATED	3	Indicates if the object value is updated	Read	(1)
UPD_BLK	4	The value is blocked by OPC Server operator or forced by ACC.	Read/Write	x
ERR_CTRL	8	Value of event set status (EVS_ERR): 0: HW errors do not generate events 1: HW errors do generate events	Read	x

Table A-8. Digital Input object type status bits

Bit in STATUS	Bit no	Description	Permissions	Not available for DAT based objects
VALUE	9	Current value	Read/Write	
ALARM_UNACK	13	Alarm unacknowledged	Read/Write	x
DISTURBANCE	15	The object is in an error state	Read	x
ALARM_BLK	17	Alarms are blocked	Read/Write	x
ALARM_PERIOD_ BLK	18	Value of event set status (EVS_STAT): 0: mode changes do not generate events 1: mode changes do generate events	Read	x
SELECTED	6	Select the object. Only within the same Advant OPC Server for AF100.	Read/Write	(1)
PRINT_BLK	19	Block alarm printouts. Only within the same Advant OPC Server for AF100.	Read/Write	x

(1) Possible to subscribe on within the same OPC Server.

A.4.2 Events

The table shows all available events for a digital input object.

Table A-9. Events for the Digital Input object type

AF100 Event	Description	OPC Event Type	OPC Event Category	Not available for DAT based objects
HW Error	Hardware error	Condition	Hardware Error	
Value Change	Value changes	Condition	Discrete	

Table A-9. Events for the Digital Input object type

AF100 Event	Description	OPC Event Type	OPC Event Category	Not available for DAT based objects
Alarm Unack	Alarm acknowledged	Condition	-	
Update Block	Disable/enable process updates	Simple	System Message	x
Alarm Block	Block/deblock of alarm handling	Simple	System Message	x
Lost Event	Lost event in controller	Simple	System Message	

A.5 Digital Output Object Type (DOS and DAT_DO)

A.5.1 Attributes

The table below shows all available attributes for a digital output object.

Table A-10. Digital Output object type attributes

Attribute	Description	Native Object Type	Permissions	Not available for DAT based objects
NAME	The name of the object	STRING	Read	
DESCRIPTION	The description of the object	STRING	Read	
ERROR_TREAT	Value of event treatment definition	INTEGER	Read	x
VALUE	The current value of the object	INTEGER	Read/Write	
VALUE_TREAT	Value of event treatment definition	INTEGER LONG	Read	(1)
NORM_POS	Normal position	BOOLEAN	Read	(1)
SUBSYSTEM	Process section 0-16	INTEGER	Read	
STATUS	Presents the status of the object	INTEGER LONG	Read	(1)

Table A-10. Digital Output object type attributes (Continued)

Attribute	**Description**	**Native Object Type**	**Permissions**	**Not available for DAT based objects**
CLASS	Class	INTEGER	Read	x
TYPE	Object type	STRING	Read	
T0VAL	String to display for value zero	STRING	Read	x
T1VAL	String to display for value one	STRING	Read	x
NETW	Equal to the bus number	INTEGER	Read	
NODE	Equal to the station number	INTEGER	Read	
CPU	CPU position	INTEGER	Read	

(1) Possible to subscribe on within the same OPC Server.

The table below shows all available status bits for a digital output object.

Table A-11. Digital Output object type status bits

Bit in STATUS	**Bit no**	**Description**	**Permissions**	**Not available for DAT based objects**
ACTIVE	1	Object active, i.e. ready to run	Read	(1)
ERROR	2	Indicates the overview status	Read	(1)
UPDATED	3	Indicates if the object value is updated	Read	(1)
OUTP_BLK	4	Output to output connection is blocked. Only within the same Advant OPC Server for AF100.	Read/Write	x

Table A-11. Digital Output object type status bits

Bit in STATUS	**Bit no**	**Description**	**Permissions**	**Not available for DAT based objects**
SELECTED	6	Select the object. Only within the same Advant OPC Server for AF100.	Read/Write	(1)
MAN_MODE	8	Object is in manual mode	Read/Write	x
START_VALUE	9	Start value	Read	x
ALARM_UNACK	13	Alarm unacknowledged	Read/Write	x
ALARM_BLK	17	Alarms are blocked	Read/Write	x
ALARM_PERIOD_ BLK	18	Value of event set status (EVS_STAT): 0: mode changes do not generate events 1: mode changes do generate events	Read	x
PRINT_BLK	19	Block alarm printouts. Only within the same Advant OPC Server for AF100.	Read/Write	x
DISTURBANCE		Value differs from normal position.	Read	x (2)
ERR_CTRL		Value of event set status (EVS_ERR): 0: HW errors do not generate events 1: HW errors do generate events	Read	x (2)

(1) Possible to subscribe on within the same OPC Server.

(2) Not used in AdvaInform Object Types.

A.5.2 Events

The table shows all available events for a digital output object.,

Table A-12. Events for the Digital Output object type

AF100 Event	Description	OPC Event Type	OPC Event Category	Not available for DAT based objects
HW Error	Hardware error	Condition	Hardware Error	x
Value Change	Value changes	Condition	Discrete	x
Alarm Unack	Alarm acknowledged	Condition	-	x
Man/Auto	Manual/auto mode changes	Simple	System Message	x
Alarm Block	Block/deblock of alarm handling	Simple	System Message	x
Lost Event	Lost event in controller	Simple	System Message	x

A.6 Simple Memory Object Type (DATx, MB, MI, MIL, MR)

A.6.1 Attributes

A.6.1.1 Attributes for DATx

The table below shows all available attributes for a simple memory object.

Table A-13. Attributes for the DAT object type

Attribute	Description	Native Object Type	Permissions
NAME	The name of the object	STRING	Read
NETW	Equal to the bus number	INTEGER	Read
NODE	Equal to the station number	INTEGER	Read
CPU	CPU position	INTEGER	Read

Table A-13. Attributes for the DAT object type

Attribute	Description	Native Object Type	Permissions
VALUE	The current value of the object	INTEGER INTEGER LONG REAL	Read/Write
TYPE	Object type	STRING	Read
B0_VAL	Boolean value 0	INTEGER	(1)
B1_VAL	Boolean value 1	INTEGER	
. .	. .		
B31_VAL	Boolean value 31	INTEGER	

(1) For DAT(R) no bits are used. For DAT(B) only the first bit is used.

A.6.1.2 Attributes for MB

The table below shows all available attributes for a simple memory object.

Table A-14. Attributes for the DAT object type

Attribute	Description	Native Object Type	Permissions
VALUE	The current value of the object	INTEGER LONG	Read/Write
NAME	The name of the object	STRING	Read
TYPE	Object type	STRING	Read
DESCRIPTION	The description of the object	STRING	Read
NETW	Equal to the bus number	INTEGER	Read
NODE	Equal to the station number	INTEGER	Read
CPU	CPU position	INTEGER	Read
B0_VAL	Boolean value 0	INTEGER	Read/Write
B1_VAL	Boolean value 1	INTEGER	Read/Write
B2_VAL	Boolean value 2	INTEGER	Read/Write
. .	. .		
B31_VAL	Boolean value 31	INTEGER	Read/Write

A.6.1.3 Attributes for MI, MIL and MR

The table below shows all available attributes for a simple memory object.

Table A-15. Attributes for the DAT object type

Attribute	Description	Native Object Type	Permissions
VALUE	The current value of the object	INTEGER, INTEGER LONG, REAL	Read/Write
NAME	The name of the object	STRING	Read
TYPE	Object type	STRING	Read
DESCRIPTION	The description of the object	STRING	Read
NETW	Equal to the bus number	INTEGER	Read
NODE	Equal to the station number	INTEGER	Read
CPU	CPU position	INTEGER	Read
UNIT	The unit of the object	STRING	Read
RANGE_MAX (1)	The highest allowed value given as a command	REAL	Read
RANGE_MIN (1)	The lowest allowed value given as a command	REAL	Read

(1) Available only for MR.

A.6.2 Events

The simple memory object type support no events (except for the MBS object type)

A.7 Simple Memory Object Type (MBS)

A.7.1 Attributes

The table below shows all available attributes for an MBS object.

Table A-16. Attributes for the MBS object type

Attribute	Description	Native Object Type	Permissions
NAME	The name of the object	STRING	Read
DESCRIPTION	The description of the object	STRING	Read

Table A-16. Attributes for the MBS object type (Continued)

Attribute	Description	Native Object Type	Permissions
VALUE_TREAT	Value of event treatment definitions	INTEGER LONG	Read
SUBSYSTEM	Process section 0-16	INTEGER	Read
CLASS	Class	INTEGER	Read
VALUE	Current value	INTEGER LONG	Read/Write
NORM_POS	Normal position	BOOL	Read
TYPE	Object type	STRING	Read
NETW	Equal to the bus number	INTEGER	Read
NODE	Equal to the station number	INTEGER	Read
CPU	CPU position	INTEGER	Read
T0VAL	String to display for value zero	STRING	Read
T1VAL	String to display for value one	STRING	Read

A.7.2 Events

The table shows all available events for an MBS object.

Table A-17. Events for the Digital Output object type

AF100 Event	Description	OPC Event Type	OPC Event Category
Value Change	Value changes	Condition	Discrete
Lost Event	Lost event in controller	Simple	System Message

Appendix B DSP Station Number Setting

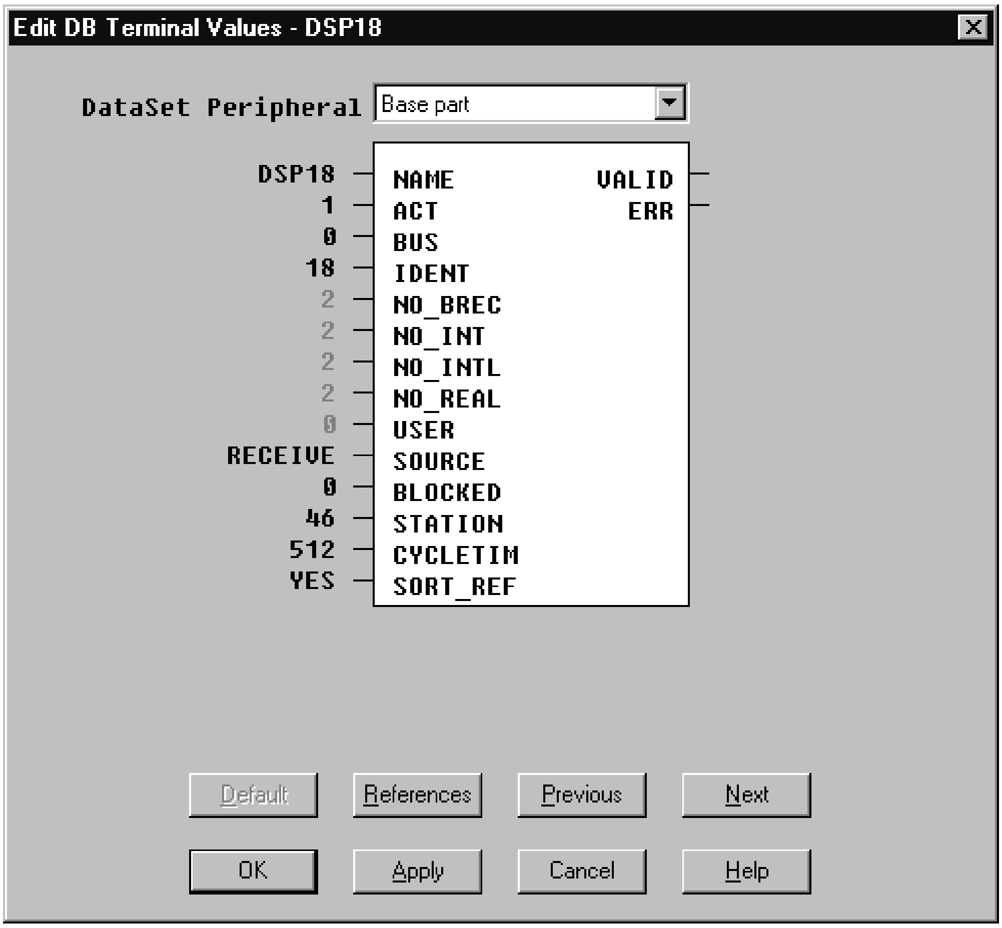
B.1 Setting the DSP Station Number

To be able to send DSPs from the Advant OPC Server for AF100 do as follows:

Configure a DSP with

- SOURCE = RECEIVE

- Set STATION to, a for this system unique station number (46 in this example).



Edit DB Terminal Values - DSP18

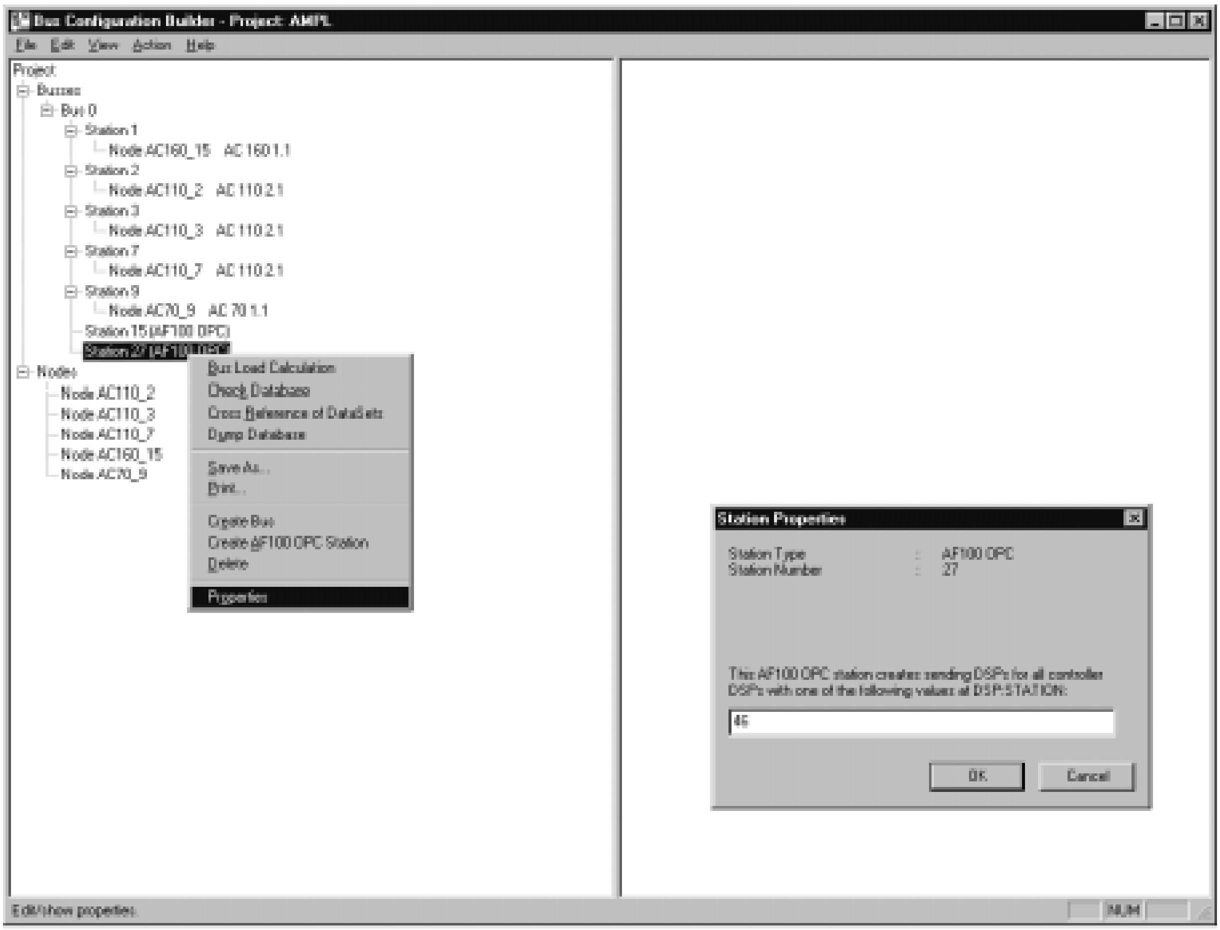
DataSet Peripheral: Base part

DSP18	NAME	VALID	
1	ACT	ERR	
0	BUS		
18	IDENT		
2	NO_BREC		
2	NO_INT		
2	NO_INTL		
2	NO_REAL		
0	USER		
RECEIVE	SOURCE		
0	BLOCKED		
46	STATION		
512	CYCLETIM		
YES	SORT_REF		

Figure B-1. Edit DB Terminal Values - DSP18

Configure the DAT and MMI objects as usual.

Run BCB and add your unique station number to your Advant OPC Server for AF100 as in the picture below.



Station Type : AF100 OPC
Station Number : 27

This AF100 OPC station creates sending DSPs for all controller DSPs with one of the following values at DSP:STATION:

46

Figure B-2. Bus Configuration Builder

Refer to BCB manuals for more details.

Appendix C Alarms and Events

C.1 Change of A & E Descriptions

Only the following objects/events can get their strings from ACC:

AIS:	Above H2Lim Below H2Lim Above H1Lim Below H1Lim Below L1Lim Above L1Lim Below L2Lim Above L2Lim
DIS:	Value differs from Normal Position (this is always the T1VAL string, independant of NORM_POS) Value goes back to Normal Position (this is always the T0VAL string, independant of NORM_POS)
DOS:	Value differs from Normal Position (this is always the T1VAL string, independant of NORM_POS) Value goes back to Normal Position (this is always the T0VAL string, independant of NORM_POS)
MBS:	Value differs from Normal Position (this is always the T1VAL string, independant of NORM_POS) Value goes back to Normal Position (this is always the T0VAL string, independant of NORM_POS)

NOTE

If these fields are empty in ACC the string will be retrieved from the registry.

Event strings for the objects DAT_AI, DAT_DI and AOS cannot be entered in ACC. They are edited in the registry.

Do as follows:

Use the example below to make a text file and name it "MyEventDescriptions .reg"

NOTE

Never use description strings longer than 20 characters.

Edit the string values (ex "Alarm") in the text file.
Save the.reg file.
Double click it.

Run the .reg file.
Restart the Advant OPC Server for AF100.

```
[HKEY_LOCAL_MACHINE\SOFTWARE\ABB\Advant\SystemModules\AF100 OPC Server\Private\EventDescriptions]
"NO_EVENT_STR"="Error! No Event"
"VALUE_CHANGE_ON_STR"="Alarm"
"VALUE_CHANGE_OFF_STR"="Normal"
"HW_ERROR_ON_STR"="Hardware error On"
"HW_ERROR_OFF_STR"="Hardware error Off"
"ALARM_BLOCK_ON_STR"="Alarm block"
"ALARM_BLOCK_OFF_STR"="Alarm deblock"
"UPDATE_BLOCK_ON_STR"="Update block"
"UPDATE_BLOCK_OFF_STR"="Update deblock"
"MAN_AUTO_ON_STR"="Manual Mode"
"MAN_AUTO_OFF_STR"="Auto mode"
"ALARM_UNACK_STR"="Alarm acknowledged"
"SHUTFILT_ACT_ON_STR"="Shutter filter On"
"SHUTFILT_ACT_OFF_STR"="Shutter filter Off"
"LOST_EVENT_STR"="Que overflow"
"H2LIM_MOD_STR"="HiLim2 modified"
"H1LIM_MOD_STR"="HiLim1 modified"
"L1LIM_MOD_STR"="LoLim1 modified"
"L2LIM_MOD_STR"="LoLim2 modified"
"H2LIM_TRANS_ON_STR"="Above HiLim2"
"H2LIM_TRANS_OFF_STR"="Below HiLim2"
"H1LIM_TRANS_ON_STR"="Above HiLim1"
"H1LIM_TRANS_OFF_STR"="Below HiLim1"
"L1LIM_TRANS_ON_STR"="Below LoLim1"
"L1LIM_TRANS_OFF_STR"="Above LoLim1"
"L2LIM_TRANS_ON_STR"="BelowLoLim2"
"L2LIM_TRANS_OFF_STR"="Above LoLim2"
```

Figure 3-1. Example" MyEventDescriptions.reg"

C.2 OPC Alarms and Events Severity

The OPC standard uses something called severity on its Alarm and Events.

The severity cannot be entered via the ACC tools.

The Advant OPC Server for AF100 has set the severities to the default values below and the severities can only be changed in the registry.

Do the following:

Use the example below to make a text file and name it "**MyEventSeverities.reg**"

Only enter severities in the range 0x01 ----> 0x3E8 (1 ---> 1000 decimal)

Manual edit the hexadecimal values (ex 0000065) in the text file,
Save the file.
Double click it.
Run your .reg file.
Restart the Advant OPC Server for AF 100.

```
[HKEY_LOCAL_MACHINE\SOFTWARE\ABB\Advant\SystemModules\AF100 OPC Server\Private\EventTypeSeverity]
"Hi2Lim"=dword:00000065
"Hi1Lim"=dword:00000064
"Lo1Lim"=dword:00000064
"Lo2Lim"=dword:00000065
"Error"=dword:00000066
"UpdBlock"=dword:00000063
"ManAuto"=dword:00000063
"ShutFiltAct"=dword:00000063
"Value"=dword:00000065
"AlarmBlock"=dword:00000063
"Hi2LimMod"=dword:00000062
"Hi1LimMod"=dword:00000062
"Lo1LimMod"=dword:00000062
"Lo2LimMod"=dword:00000062
"LostEvent"=dword:00000065
"AlarmUnAck"=dword:00000063
```

Figure C-2. Example of “MyEventSeverities.reg”

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